



ENTOMOLOGY 2019

NOVEMBER 17-20 • ST. LOUIS, MO



PROGRAM BOOK



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ENTOMOLOGY 2019

NOVEMBER 17-20 • ST. LOUIS, MO

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First Aid is located on level one of America's Center near the Washington Avenue Entrance and is located directly next to ESA registration. Call +1 314-342-5066 (or from any house phone, dial 5016). In a life-threatening emergency, dial 911.

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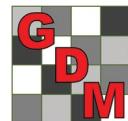


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Presidential Welcome Message for Entomology 2019

Welcome to Entomology 2019 and St. Louis. The meeting's theme is Advocate Entomology! and the focus is on the innovative things that we can do to promote our science. Think of Entomology 2019 as a platform for you to flex your ento-preneurial muscles, innovate, and advocate.

Our program committee chairs, Rayda Krell and Patti Prasifka, and the entire Annual Meeting Program Committee have planned a fantastic program. The opening session will feature Erica McAlister, dipterist, science communicator extraordinaire, and tireless advocate of all things entomology. We're excited to have our inaugural Antlion Pit pitch competition Monday afternoon for the teams that have earned their way to the final event. Be sure to attend the Awards Breakfast Tuesday morning, which will include our Founders' Memorial Lecture. This year our awardee is Walter Leal, who is honoring Thomas Eisner.

The ESA Program Committee, leadership, staff, and I are committed to creating a welcoming meeting environment for all attendees. At this meeting and indeed all of the time, we remain committed to our core strategic principles:

- ESA has a social responsibility to develop ALL of its members.
- The science of entomology is global; therefore, ESA is global.
- ESA must increase its influence to realize our profession's full potential.

Our Society depends on all of its members, and we need your leadership now more than ever to help us rethink and reshape entomology. At Entomology 2019, let's advocate and innovate together for our amazing discipline.



Dr. Robert K.D. Peterson
2019 ESA President



PROGRAM COMMITTEE

Pictured Above: From left to right: (Back row) Marianne Alleyne, Jeff Bradshaw, Rayda Krell, Patti Prasifka, Robert Peterson, Cheryle O'Donnell, Theresa Pitts-Singer, Kun Yan Zhu, Floyd W. Shockley, (Front row) Dana Nayduch, Diane Alston, Jocelyn Holt, Surendra Dara, Juang-Horng "JC" Chong

Not Pictured: Changlu Wang, David O'Brochta and Jennifer Zaspel

Program Committee Co-Chairs' Welcome

Welcome to St. Louis!

We are thrilled to have you join us for the 67th Annual Meeting of the Entomological Society of America! You are going to love this meeting! From the easy and walkable downtown between hotels, the convention center, and attractions, to the competitive pricing and the many one-of-a-kind (and free!) things to do in St. Louis, you are going to have a vibrant and fun meeting experience.

If you notice a different vibe at this year's meeting, it might be because we have record-breaking student participation. Over 30% of the total presentations in the program are from students! It is exciting to know there is a robust and engaged pipeline for entomology.

Our Society is so fortunate to have deeply dedicated staff and volunteers who have been working over the past year to curate an innovative and invigorating meeting program to support President Bob Peterson's vision for the Advocate Entomology! theme. This year's meeting will include everything you know and love about ESA meetings with thought-provoking symposia, skill-development workshops, productive Lunch and Learns, and rich poster sessions. But this meeting will also delight you with new features and surprises!

Sunday evening, the meeting will kick off with a plenary presentation by Erica McAlister, author of *The Secret Life of Flies* and senior curator at the Natural History Museum in London. Dr. McAlister is an engaging speaker, inspiring scientist, and passionate entomology advocate! Her talk will set the tone for the meeting.

Additionally, Walter Leal will deliver the Founders' Memorial Award lecture on Monday, November 18, at 7:30 AM to honor Thomas Eisner, the "father of chemical ecology" and another devoted entomology advocate. The lecture, "Tom Eisner: An Incorrigible Entomophile and Innovator *Par Excellence*," will highlight Eisner's legacy.

For the first time ever, the meeting will feature an "ento-preneurial" pitch competition, The Antlion Pit. Marianne Alleyne, the competition leader, crafted guidelines and webinars to guide innovation teams through idea development and pitch preparation. A starting pool of 26 entries competed to make it to the national, live, final pitch, and \$10,000 in funding will be awarded to the top pitches to support entomological innovation: a \$5,000 Grand Prize, \$2,500 for Second Place, and \$2,500 for the Audience Favorite—so please participate! Who will make it out of the Antlion Pit to innovate the future of entomology? Come and find out on Monday afternoon in the final live event—you won't want to miss this!

Also new this year, the poster session will feature infographics as a special category. This new format encourages the use of highly visual presentations of research or informational material to maximize its impact. This category is open to both student competition participants and regular members. Be sure to check out the infographics in the Exhibit Hall.

The schedule this year features four program symposia and four program workshops that capture the spirit of this year's theme.

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Below is a summary of these featured events:

● **SUNDAY, NOVEMBER 17**

Program Symposia:

8:00 to 11:45 AM

Marketing Entomology in the 21st Century: Delivering Knowledge, Changing Attitudes, and Encouraging Action

Organizers: David Onstad and Keri Carstens

1:30 to 5:30 PM

Advocating Diversity Among Entomologists: If Insects Are Diverse, We Should Be, Too!

Organizers: Katelyn Kesheimer, Hannah Penn, Gail Kampmeier, Karen Walker, and Phyllis Weintraub

Program Workshop:

8:00 AM to 12:00 PM

Program Workshop: From Instars to Adults: Implementing Outreach Activities Across

Different Education Levels and Audiences

Organizers: Lauren Weidner and John Cambridge

● **MONDAY, NOVEMBER 18**

Program Workshop:

8:00 AM to 12:00 PM

Start Advocating Entomology on Social Media!

Organizers: Ryan Gott and Karly Regan

● **TUESDAY, NOVEMBER 19**

Program Symposium:

1:30 to 5:30 PM

Insect Decline in the Anthropocene

Organizer: David Wagner

Program Workshops:

9:00 AM to 12:00 PM

If They're Laughing, They're Listening

Organizers: Meaghan Pimsler, Lauren Diepenbrock, and Brian Lovett

1:30 to 5:30 PM

ComSciCon Entomology

Organizers: Sheryl Hosler, Maxwell Helmberger, Laura Kraft, and Kaylee Arnold

● **WEDNESDAY, NOVEMBER 20**

Program Symposium:

9:00 AM to 12:20 PM

Working with the Fourth Estate: Building Bridges between Science and the Media

Organizers: Lauren Diepenbrock and Susan Weller

In addition to these featured events, overall there will be more than 2,300 oral presentations and more than 650 posters/infographics! Approximately one-third of these will comprise the Student Competition on Monday, November 18. This year, our excellent convention center space allows us to have all students compete on the same day. Our Student Competition co-chairs, Juang-Horng (JC) Chong and Theresa Pitts-Singer, have done a fantastic job to ensure the competition provides a positive forum for students to share their work.

While we certainly hope you will make the most of the scientific program, St. Louis has a lot to offer and you might want to take in one of the many local attractions or meeting tours such as the Bayer Research and Development Center tour (free!), Gateway to St. Louis intro tour, tour of the beautiful Forest Park area.

Now get out there and enjoy the meeting!

~ Rayda K. Krell and Patti L. Prasifka, 2019 ESA Program Committee Co-Chairs

General Information

America's Center and the Marriott Grand St. Louis

Located in the heart of downtown St. Louis, the America's Center Convention Complex is home to four distinct meeting facilities under one roof and will host all Entomology 2019 scientific sessions and plenary and poster presentations. The Marriott Grand St. Louis Hotel will host ESA committee meetings, evening receptions, and university mixers.



America's Center
701 Convention Plaza



Marriott Grand St. Louis Hotel
800 Washington Avenue

Registration & Information Center

Registration will be held in the Washington Avenue Lobby outside Hall 1 of America's Center during the following times:

Saturday, November 16 • 10:00 AM – 4:00 PM

Sunday, November 17 • 7:00 AM – 9:00 PM

Monday, November 18 • 7:00 AM – 5:00 PM

Tuesday, November 19 • 7:00 AM – 5:00 PM

Wednesday, November 20 • 7:00 AM – 12:00 PM

Registration & Information Center phone number: 314-342-5000

Attendees can pick up their registration materials at the Registration & Information Center. ESA staff members are always available to answer your questions.

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Certificates of Presentation and Attendance

Presenters can download and print onsite certificates of presentation and attendance in the Presentation Preview Room (PPR) in Room 106 of America's Center after their presentation has taken place. For hours of operation of the PPR, please see page 9. Attendees who did not present during Entomology 2019 may request certificates of attendance at the Registration & Information Center. Certificates will also be available for download via the Speaker's Corner online after the conference ends; a personalized link will be provided after the Annual Meeting.

Code of Conduct

By attending any ESA event, you agree voluntarily to abide by our ethics policy.

Authorship: All authors connected to a presentation and/or abstract must agree on all information contained in the presentation. Failure of an author to agree to the presentation format and content will lead to the presentation being withdrawn from the conference.

An author who submits a presentation to the Annual Meeting must have intentions of attending, registering, and presenting at the meeting once the submission is accepted into the program. Repeated or consecutive last-minute cancellations by presenters may result in future submissions being denied.

Harassment and Safety: ESA is dedicated to providing a safe, hospitable, and productive environment for everyone attending our events, regardless of ethnicity, religion, disability, physical appearance, gender, gender identity, or sexual orientation. It is important to remember that a community where people feel uncomfortable or threatened is neither healthy nor productive. Accordingly, ESA prohibits intimidating, threatening, or harassing conduct during our conferences. This policy applies to speakers, staff, volunteers, exhibitors and attendees. Conference participants violating these rules may be sanctioned or expelled from the conference, at the discretion of ESA leadership.

Harassment of ESA participants will not be tolerated in any form. Harassment includes offensive gestures or verbal comments related to ethnicity, religion, disability, physical appearance, gender, or sexual orientation in public spaces, deliberate intimidation, stalking, following, harassing photography or recording, sustained disruption of talks or other events, inappropriate physical contact, and unwelcome attention. Participants asked to stop any harassing behavior are expected to comply immediately.

If a participant or exhibitor engages in harassing behavior, ESA leadership may take any action they deem appropriate, ranging from a simple warning to the offender to expulsion from this and future conferences. If you are being harassed, notice that someone else is being harassed, or have any other concerns, please contact ESA staff who can work with appropriate ESA leadership to resolve the situation.

ESA staff will work with convention center/hotel/venue security and/or local law enforcement, and otherwise assist those experiencing harassment, to enable them to feel safe for the duration of the conference. We value your attendance and want to make your experience as productive and professionally stimulating as possible.

Expected Behavior:

- Communicate openly with respect and consideration for others, valuing a diversity of views and opinions.
- Avoid personal attacks directed toward other attendees, participants, volunteers, exhibitors, staff, and suppliers/vendors.
- Be mindful of our surroundings and your fellow participants. Alert staff (instructions below) if you notice a dangerous situation or someone in distress.
- Respect the rules and policies of the convention center, hotels, contracted facility, or any other venue.
- Request permission from speakers before recording or taking photographs during their presentation, including posters. Turn off any ringers or otherwise disrupting devices during oral or poster sessions.

Unacceptable Behavior:

It is important that our meeting be a place where no attendee or staff is ever belittled, criticized, or made to feel unsafe. The following behavior will not be tolerated:

- Harassment, intimidation, or discrimination in any form.
- Physical, written, or verbal abuse of any attendee, speaker, volunteer, exhibitor, staff member, service provider, or other meeting guest.
- Examples of unacceptable behavior include, but are not limited to, verbal comments related to gender, sexual orientation, disability, physical appearance, body size, race, religion, or national origin; inappropriate use of nudity and/or sexual images in public spaces or in presentations; and threatening or stalking any attendee, speaker, volunteer, exhibitor, staff member, service provider, or other meeting guest.

Need to file a complaint? Please contact Paula Brantner and Ana Avendano, our onsite and postconference ombudspeople. They can be reached at 240-772-1205 (Paula's phone) or safeconferences@gmail.com. For any safety concerns, please contact Rosina Romano, ESA director of meetings at 703-593-0222 or any nearby ESA staff.

- All reports are kept confidential to the extent possible. We do not share the names of reporters with leadership when determining next steps.
- You may choose to submit an anonymous report. Please note that while we will keep track of anonymous reports, we cannot act on a single anonymous report without further corroboration.
- All reports are taken seriously and will be investigated.
- We will gather all relevant details and information (verbal or written) from the reporter, the target (if they are not the reporter), and witnesses. Please note that investigations may extend beyond the end of the meeting.
- The outcomes of investigations and subsequent sanctions will not be made public; however, those reporting incidents may request to be informed of the outcome.
- In addition to the actions that may be taken at meetings (as described above), violators of the Code of Conduct will receive written documentation of the actions taken at and following the meeting.



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General Information

Photography

ESA requests that attendees do not take photographs or videos during sessions because they are disruptive to the presenters. If you wish to take photographs of a presentation or poster, please contact the presenter for permission. Any presenters who are OK with sharing their slides are encouraged to indicate this at the beginning of their presentation or use permission icons on their slides or poster.



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MEDIA

ESA reserves the right to use photographs and videos taken and testimonials given during any ESA event for informational and promotional purposes.

Network

ESA is providing complimentary wireless internet throughout America's Center.

Network: ESA2019

Password: #entsoc2019

Mothers' Rooms

Two private spaces for nursing mothers are available within America's Center. A Mamava pod is available just outside Room 106, and Room 251 will be set up with private, curtained space. Both rooms will have refrigerators available. To access the Mamava, use the access code posted near the door when it is not in use. ESA also supports all nursing mothers to nurse as needed in all general meeting spaces and nursing in public is protected by Missouri state law.

Program Information

Uploading Presentations

All presenters are requested to upload their presentations the day before their scheduled session. Presenters may upload and/or preview their presentations in the Presentation Preview Room (PPR) located in Room 106 of America's Center. Operating hours are as follows:

Saturday, November 16 • 3:00 – 6:00 PM
Sunday, November 17 • 7:00 AM – 6:00 PM
Monday, November 18 • 7:00 AM – 6:00 PM
Tuesday, November 19 • 7:00 AM – 6:00 PM
Wednesday, November 20 • 7:00 AM – 12:00 PM

Documentary Film Screening: "The Love Bugs"

Tuesday, November 19 • 6:30 – 7:30 PM

Room 223-226, America's Center

Over the course of 60 years, Lois and Charlie O'Brien—two of the foremost entomologists and pioneers in their field—traveled to over 70 countries and quietly amassed the world's largest private collection of insects. Charlie was the Indiana Jones of entomology and Lois was his Marion Ravenwood. Their collection is a scientific game-changer, with more than one million specimens and more than 1,000 undiscovered species. But in the past several years, the O'Briens have grappled with the increasingly debilitating effects of Charlie's Parkinson's disease and the emotional toll it takes on Lois. Charlie, 85, and Lois, 91, realize that a chapter of exploration and discovery is coming to an end in their lives. But they live in a time when the beleaguered field of science needs them most. And the O'Briens know they need to continue fighting for it—so they turn to their 1.25 million insects for a little help. This humorous and poignant documentary short explores the nature of love—and the love of nature—and what it means to devote oneself completely to both.

Posters and Infographics

The Program Committee has scheduled three days of posters and infographic sessions for the Annual Meeting. Posters and infographics are numbered sequentially in the program and, where possible, grouped according to ESA Section and subject matter. Authors must display their posters or infographics on the board bearing the same number as that indicated in the program book for each poster.

Setup

For Posters within Symposia: You may display your poster 30 minutes prior to the start of the symposium and up to 30 minutes after the end of your symposium. Bring your own Velcro strips to secure your display to the poster board. The poster board is covered with felt cloth and the frame is aluminum. Please do not attach anything to the metal frame.

For Student Competition and Contributed Posters and Infographics: Your poster or infographic must be placed in the assigned numbered space in the Exhibit Hall the night before your poster is scheduled (see "Poster and Infographic Presentation Times" for additional information). Bring your own Velcro strips to secure your display to the poster board. The poster board is covered with felt cloth and the frame is aluminum. Please do not attach anything to the metal frame.

Poster/Infographic Presentation Times

For Posters within Symposia: Each symposium has designated a specific time for poster presenters to be present at their posters. Presenters are expected to be available at their displays during the "Poster Session" time slot for questions and discussion. Check your symposium schedule for exact times.

For Student Competition and Contributed Posters and Infographics: Presenters are expected to be available at their displays during the "Authors Present" time slot for questions and discussion. A cash bar reception area will be set up within the poster and infographic display area during presentation times.

Monday, November 18 (Student Competition):

Setup: Sunday, 7:30 – 9:30 PM
Viewing: Monday, 9:00 AM – 6:30 PM
Authors Present:
Posters/Infographics with odd numbers: 5:30 – 6:00 PM
Posters/Infographics with even numbers: 6:00 – 6:30 PM
Takedown: Monday, 6:30 – 7:30 PM

Tuesday, November 19 (Contributed Posters/Infographics):

Setup: Monday, 7:30 – 9:30 PM
Viewing: Tuesday, 9:00 AM – 6:30 PM
Authors Present:
Posters/Infographics with odd numbers: 5:30 – 6:00 PM
Posters/Infographics with even numbers: 6:00 – 6:30 PM
Takedown: Tuesday, 6:30 – 7:30 PM

Wednesday, November 20 (Contributed Posters/Infographics):

Setup: Tuesday, 7:30 – 9:30 PM
Viewing: Wednesday, 9:00 AM – 2:00 PM
Authors Present:
Posters/Infographics with odd numbers: 12:30 – 1:00 PM
Posters/Infographics with even numbers: 1:00 – 1:30 PM
Takedown: 2:00 – 3:00 PM

Removal: Posters and infographics should be removed promptly between 6:30 and 7:30 PM on Monday and Tuesday, and between 2:00 and 3:00 PM on Wednesday. Please do not remove your poster or infographic before the close of the scheduled viewing time. Do not remove poster or infographic numbers from boards.

Virtual Posters/Infographics

Virtual posters and infographics provide a unique opportunity to view the research of entomologists from across the globe, many of whom are unable to attend the meeting in person. These e-posters/infographics will be positioned in the Exhibit Hall near the printed posters/infographics on large, flat-screen monitors. Attendees will be able to scroll through the virtual posters and infographics throughout the day to view the variety of research taking place around the world.

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Lunch & Learns

Participants should bring lunch with them as lunch will not be provided. Concession options will be available near the Lunch and Learn meetings room, so you can quickly purchase your lunch and enjoy it during the presentation.

■ Selling Yourself and Building Your Brand as an Early Career Professional

Sunday, November 17 • 12:15 – 1:15 PM
Room 130, America's Center

Sydney Crawley, Scotts Miracle Gro, Marysville, OH; **Katelyn A. Kowles**, Eastern Illinois University, Charleston, IL; **Monique Rivera**, University of California, Riverside, CA; **Katelyn Kesheimer**, Auburn University, Auburn, AL

After constantly talking about your research as a graduate student, you forget how to talk about YOURSELF! It feels selfish to ramble about personal accomplishments in an interview. However, landing a job requires personal advocacy, so visit our lunch and learn to finally get comfortable building and selling your brand!

■ The Journal of Entomological Education and Outreach

Sunday, November 17 • 12:15 – 1:15 PM
Room 131, America's Center

Craig Coates, Texas A&M University, College Station, TX; **Adrienne Brundage**, Texas A&M University, College Station, TX; **W. Wyatt Hoback**, Oklahoma State University, Stillwater, OK; **Rupesh Kariyat**, University of Texas Rio Grande Valley, Edinburg, TX

This Lunch & Learn session will introduce participants to the *Journal of Entomological Education and Outreach* (JEEO). We will describe how participants can submit articles and be involved in staffing the journal. This journal will give teaching- and outreach-centric professionals a place to communicate their work.

■ Funding Opportunities at the National Science Foundation

Monday, November 18 • 12:15 – 1:15 PM
Room 131, America's Center

Katharina Dittmar, National Science Foundation, Alexandria, VA; **Michelle Elekovich**, National Science Foundation, Alexandria, VA; **Cesar Nufio**, National Science Foundation, Arlington, VA

The National Science Foundation (NSF) provides many opportunities for funding basic research and training in ecology, evolution, behavior, physiology, collections, and a variety of related disciplines. Covered topics will include the 'no deadline model', the 'Rules of Life' track within the Directorate for Biological Sciences, and other funding opportunities.

■ Navigating Cultural Diversity in Scientific Research, Education, and Leadership

Monday, November 18 • 12:15 – 1:15 PM
Room 130, America's Center

Harit K. Bal, Association of Indian Entomologists in North America, Chesterfield, MO; **Swapna Rajarapu**, The Ohio State University, Wooster, OH; **Nandi Nagaraj**, Corteva AgriScience, Indianapolis, IN; **Smitha George**, University of Kentucky, Lexington, KY; **Garima Kakkar**, University of Florida, Fort Pierce, FL; **Ameya Gondhalekar**, Purdue University, West Lafayette, IN; **Vivek Kumar**, University of Florida, Apopka, FL; **Surendra K. Dara**, University of California Cooperative Extension, San Luis Obispo, CA; **Subba Reddy Palli**, University of Kentucky, Lexington, KY; **Luis Canas**, The Ohio State University, Wooster, OH; **Arianne Cease**, Arizona State University, Tempe, AZ; **Peter Asiimwe**, Bayer Crop Science, Chesterfield, MO; **Linda Mason**, Purdue University, West Lafayette, IN

With the growing importance of diversity and inclusivity in various professional fields, there is a need to educate students and early professionals for a successful career. The goal of our session is to facilitate discussions with professionals in academia and industry with the experience in a culturally diverse workplace.

■ How to Advocate for Your Publications

Tuesday, November 19 • 12:15 – 1:15 PM
Room 131, America's Center

Lisa Junker, Entomological Society of America, Annapolis, MD; **Ashley Kennedy**, University of Delaware, Newark, DE; **Michael J. Raupp**, University of Maryland, College Park, MD; **Immo Hansen**, New Mexico State University, Las Cruces, NM; **Elizabeth Barnes**, Purdue University, West Lafayette, IN

As the amount of research published increases each year, individual scientists have the power to cut through the clutter and advocate for the importance and interest of their work. Learn how your peers have successfully promoted their publications and gain the tools and skills you need to do the same.

■ Getting Your Foot in the Door for Section Leadership Positions

Tuesday, November 19 • 12:15 – 1:15 PM
Room 132, America's Center

Floyd Shockley, Smithsonian Institution, National Museum of Natural History, Washington, DC; **Jennifer M. Zaspel**, Milwaukee Public Museum, Milwaukee, WI

Interested in getting more involved in the SysEB Section? Join current SysEB Section Governing Council members to learn more

about their roles, responsibilities, and in-roads to leadership. The Governing Council will also serve as a panel to answer any questions from attendees.

■ So, You're on the Academic Job Market: Drafting Memorable Statements, Secrets from the Search Committee, and Advice from Recent Hires

Tuesday, November 19 • 12:15 – 1:15 PM
Room 130, America's Center

Carly Tribull, Farmingdale State College, Farmingdale, NY; **Monique Rivera**, University of California, Riverside, CA; **Katelyn Kesheimer**, Auburn University, Auburn, AL; **Phillip Barden**, American Museum of Natural History, New York, NY

Applying for academic jobs? Seeking guidance from entomologists who have gone through the process recently? Then join us as we cover preparing your application materials (curriculum vitae, plus teaching, research, and diversity statements), the phone interview, the on-campus interview, and insider information on how search committees review applicants.

■ A Beginner's Introduction to 3D Printing for Entomologists

Wednesday, November 20 • 12:15 – 1:15 PM
Room 131, America's Center

Amanda Tokash-Peters, University of Massachusetts, Boston, MA

A complete beginner's introduction to the design and pre-print steps of 3D printing, using software such as Thingiverse, TinkerCAD, and Ultimaker Cura. This session is for anyone looking to implement their own inexpensive custom equipment designs, traps, or physical models in a lab (or similar) setting.

■ What's Your Story? Tips and Tricks for Telling Compelling Entomology

Wednesday, November 20 • 12:15 – 1:15 PM
Room 130, America's Center

Katelyn Kesheimer, Auburn University, Auburn, AL; **Elizabeth Dykstra**, Washington State Department of Health, Olympia, WA; **Scott O'Neal**, University of Nebraska, Lincoln, NE; **Lina Bernaola**, Louisiana State University, Baton Rouge, LA

This session will explore the art of sharing your entomological expertise through non-scientific writing taught by Gillian Parish, MFA, assistant professor of writing at Lindenwood University in St. Charles, MO. Attendees will learn how to write captivating stories, both fiction and nonfiction, to share our science with a general audience.

Tours

Advance registration is suggested as we expect many of our tours to sell out. All tours will depart from the Registration and Information Center. Please arrive 15 minutes prior to the start so the tour can promptly depart.

■ 5K Fun Run/Running/Walking Tour of St. Louis



Sunday, November 17 • 7:00 – 8:30 AM
Fee: \$35 per person

Start Entomology 2019 on the right foot and see the city via a Sunday morning sightseeing fun run through the streets of St. Louis. The tour will step off with both running and walking groups that will see St. Louis's oldest buildings still in use and travel under the Gateway Arch and through a park dedicated to the Olympic spirit.

■ Gateway to St. Louis Intro Tour



Sunday, November 17 • 12:00 – 4:00 PM
Fee: \$53 per person

First time in St. Louis? Join your fellow entomologists to see all the highlights and see the city from the very top of the Gateway Arch. Now that you have the lay of the land, continue your driving tour that includes an overview of Laclede's Landing, the Old Cathedral, the Old Courthouse, Busch Stadium, Citygarden, and a stop at the New Cathedral in Midtown. If time permits, drive through the Central West End and a Forest Park overview. This tour includes a certified tour guide, tram ride at the Gateway Arch, transportation, and driver and guide gratuities.

■ Bayer Research and Development



Monday, November 18
12:30 – 3:15 PM and 3:15 – 6:00 PM (students only)

Tuesday, November 19
7:30 – 10:15 AM and 10:15 AM – 12:30 PM

Tuesday, November 19
12:30 – 3:15 PM and 3:15 – 5:30 PM
Fee: Complimentary

Advanced registration required. Tour limited to guests 18 years of age or older. Full contact information for all participants will be provided to Bayer in advance of the tour for preapproval. Failure to register with your full legal name, address, phone number, and e-mail address may result in your tour cancellation. Registration for the Bayer tour will require a two-step process. Additional information will be collected in early October.

Modern agriculture is about evolving agricultural innovations and farming practices that help farmers increase efficiency and reduce the amount of natural resources necessary to meet the world's food, fuel, and fiber needs. Come tour Bayer's Chesterfield campus in St. Louis to see how Bayer collaborates with farmers and partners to develop innovative solutions. You will see many of the facilities and have the opportunity to ask questions about Bayer, what motivates the people who work there, and the innovation driving agriculture today.

■ Donald Danforth Plant Science Center



Monday, November 18 • 1:30 – 4:00 PM
Fee: \$20 per person

The Donald Danforth Plant Science Center is a not-for-profit research institute. Join a special tour of this unique facility. Built to improve the human condition through plant science, you'll see the scientific teams focus their research at the nexus of food, energy, and the environment to improve the productivity and sustainability of agriculture. Interactive teams develop unique platforms to discover underlying principles about how plants work, converting that knowledge into useful crops and products, and partner with organizations that are best positioned to solve problems where they exist around the world. Tour includes transportation, a donation to the Danforth Center, and driver gratuities.

■ Forest Park "Meet Me in St. Louis"



Tuesday, November 19 • 9:00 AM – 3:00 PM
Fee: \$39 per person

Once home to the 1904 World's Fair, Forest Park is one of the largest urban parks in the United States. Attracting 12 million visitors a year, you'll have the opportunity to visit three world-class attractions within the park, including Saint Louis Science Center, the Missouri History Museum, and the Saint Louis Zoo featuring the Monsanto Insectarium. This tour includes transportation to Forest Park with a shuttle between attractions, and driver and guide gratuities. Guests may depart America's Center at 9:00 AM or 12:30 PM and return at 12:30 PM or 3:00 PM.

Workshops

Full descriptions are available online at entsoc.org/workshops. Advance registration is required for some workshops.

PROGRAM WORKSHOPS

■ From Instars to Adults: Implementing Outreach Activities across Different Education Levels and Audiences

Sunday, November 17 • 8:00 AM – 12:00 PM
Room 261, America's Center
Fee: \$10 per person advance registration req.

Adrienne Brundage, Texas A&M University, College Station, TX; **Lauren Weidner**, Arizona State University, Glendale, AZ; **John Cambridge**, Philadelphia Insectarium and Butterfly Pavilion, Philadelphia, PA; **Royce Cumming**, American Museum of Natural History, City University New York

This workshop will review different type of outreach projects, displays, and activities that will span all age ranges (children to adults). Some activities/projects will focus on reaching students in the classroom (K-12), while others will be aimed more towards reaching the general public.

■ Start Advocating Entomology on Social Media!

Monday, November 18
8:00 – 9:50 AM and 10:00 – 11:50 AM
Room 261, America's Center
Fee: \$5 per person advance registration req.

Ryan Gott, Phipps Conservatory and Botanical Gardens, Pittsburgh, PA; **Karly Regan**, Cornell University, Geneva, NY; **Isa Betancourt**, The Academy of Natural Sciences of Drexel University, Philadelphia, PA; **Esther Ngumbi**, University of Illinois, Champaign, IL; **Jody Green**, University of Nebraska, Lincoln, NE; Alex Wild, University of Texas, Austin, TX

Want to share your science on social media or improve your existing efforts? We want to help! A panel of social media experts will share their experiences and answer questions followed by hands-on work with the platform Twitter to make accounts, discuss its functions, and, of course, tweet.

■ If They're Laughing, They're Listening

Tuesday, November 19
9:00 – 10:30 AM and 10:45 AM – 12:15 PM
Room 261, America's Center
Fee: \$10 per person advance registration req.

Meaghan Pimsler, University of Alabama, Tuscaloosa, AL; **Lauren Diepenbrock**, University of Missouri, Columbia, MO; **Brian Lovett**, University of Maryland, College Park, MD

Find out what stand-up comedy can teach science communicators in this 90-minute immersive workshop designed to break your academic bad habits. You will learn the basics of comedy writing and performance that will make any topic more accessible and engaging.

■ ComSciCon Entomology

Tuesday, November 19 • 1:30 – 5:30 PM
Room 265, America's Center
Fee: \$5 per person advance registration req.

ComSciCon is a workshop run by and for graduate students interested in honing their science communication skills and knowledge. Participants will practice scicomm exercises

including elevator pitches and editing written media for public consumption, and will also have opportunities to network with one another and with science communication experts.

■ Classical Biological Control of Weeds: Petition Development, Improvement, Submission, and Review

Sunday, November 17 • 1:30 – 5:30 PM
Room 261, America's Center
Fee: \$5 per person advance registration req.

Sharlene Sing, Rocky Mountain Research Station, USDA - Forest Service, Bozeman, MT; **Carey Minteer**, University of Florida, Indian River Research and Education Center, Fort Pierce, FL; **Alfred F. CoFrancesco**, US Army Corps of Engineers, Vicksburg, MS; **Michael Pitcairn**, California Department of Food and Agriculture, Sacramento, CA; **Robert Nowierski**, USDA - NIFA, Washington, DC; **John A. Goolsby**, USDA - ARS, Edinburg, TX; **Greg Wheeler**, USDA - ARS, Fort Lauderdale, FL; **Cindy Hall**, USDI Fish and Wildlife Service, Arlington, VA; **Mark Schwarzerländer**, University of Idaho, Moscow, ID; **Jeffrey L. Littlefield**, Montana State University, Bozeman, MT; **Peter Mason**, Agriculture and Agri-Food Canada, Ottawa, ON, Canada; **Robert Pfannenstiel**, USDA - APHIS, Riverdale, MD

The proposed workshop will provide practical and strategic training on the preparation (and improvement) of petitions for permits to make initial U.S. environmental releases of nonnative phytophagous agents for classical biological control of exotic, invasive plants.

■ Work on Your Social Life: Starting Social Science Collaborations

Monday, November 18 • 8:00 – 11:00 AM
Rooms 225/226, America's Center

Hannah Penn, Louisiana State University, Baton Rouge, LA; **Katelyn Kesheimer**, Auburn University, Auburn, AL; **Scott O'Neal**, University of Nebraska, Lincoln, NE; **Monique Rivera**, University of California, Riverside, CA; **Jerrod Penn**, Louisiana State University, Baton Rouge, LA; **Erika Machtinger**, Pennsylvania State University, University Park, PA; **Keith Machtinger**, Pennsylvania State University, University Park, PA

Want to learn how to design a survey without leading questions and get valuable feedback from stakeholders? Or how to incorporate human history into a class on insect-vector disease? In this workshop you will learn tools and methods to integrate biological with social science to develop interdisciplinary projects and collaborations.

■ Entomological Edutainment and Portal to the Public

Tuesday, November 19 • 12:30 – 4:30 PM
St. Louis Science Center (off site)
Fee: \$40, includes materials and off-site transportation to the Science Center advance registration required

Maddie Ernest, Saint Louis Science Center, St. Louis, MO

Transform your research into an engaging public experience through a Portal to the Public workshop at the St. Louis Science Center.

This workshop will cover methods and best practices for translating science and research content into engaging experiences and effective messages for the public of all ages. Participants will explore the center's examples of effective experience design and will have the opportunity to both design and test interactive experiences based on their research. Coaching and facilitation will be provided by Science Center Science, Education, and Experience staff.

■ ARM Software Training for the Industry

Wednesday, November 20 • 8:00 AM – 5:00 PM
Room 262, America's Center
Fee: \$5 for current students; \$10 for faculty advance registration required

Kyle Kepner, Gylling Data Management, Brookings, SD

Want to learn how to design a survey without leading questions and get valuable feedback from stakeholders? Or how to incorporate human history into a class on insect-vector disease? In this workshop you will learn tools and methods to integrate biological with social science to develop interdisciplinary projects and collaborations.

■ Cultivating an Inclusive Environment: Recognizing and Responding to Implicit Bias

Wednesday, November 20 • 9:00 AM – 12:00 PM
Room 224, America's Center

Leo Taylor, The Ohio State University, Columbus, OH; **Ana Vélez**, University of Nebraska, Lincoln, NE

Implicit bias refers to involuntarily activated attitudes and stereotypes that affect our understanding, actions, and decisions in an unconscious manner. This workshop, hosted by the Diversity and Inclusion Committee, will explore how implicit bias affects everyone and how to become a better advocate. No previous experience required. All are welcome!

■ Using Generalist Arthropod Biological Control Agents: Ensuring Effectiveness and Safety

Wednesday, November 20 • 9:00 AM – 4:30 PM
Room 261, America's Center
Fee: \$15 per person advance registration req.

David A. Andow, University of Minnesota, St. Paul, MN; **Debora Pires Paula**, Parque Estação Biológica, Brazil; **Joop van Lenteren**, Wageningen University, Netherlands; **Barbara Barratt**, Invermay Agricultural Centre, New Zealand; **Robert Pfannenstiel**, USDA - ARS, Manhattan, KS

This one-day workshop begins with short presentations that focus on the research challenges in developing an environmental risk assessment for generalist arthropod biological control agents. This will be followed by structured interactions to give an opportunity to resolve controversies, identify knowledge gaps and develop next steps, including possible research collaborations.



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Plenaries

Opening Plenary Session with Keynote Speaker Erica McAlister

Sunday, November 17 • 5:30 – 7:30 PM

America's Ballroom, America's Center

- 5:30 Introduction of Executive Committee and Introductory Remarks by Robert Peterson
- 5:40 Presidential Address by Robert Peterson
- 6:00 ESA Executive Director Remarks by C. David Gammel
- 6:10 Invitation to ICE 2020 Helsinki. Heikki Hokkanen
- 6:20 Awards: ESA Honorary Members and Fellows
- 6:40 Introduction of Plenary Keynote Presenter by Robert Peterson
- 6:45 Keynote Presentation by Erica McAlister: "Murder, Maggots and Mayhem"
- 7:30 Adjourn to the Welcome Reception in the Exhibit Hall



Erica McAlister studied applied environmental biology for her undergraduate at the University of Manchester in the early 1990s. While there, she was able to undertake two placements, the first at the then-Institute of Terrestrial Biology, where she ran around catching heather beetles on the Dorset Heaths and worked on their Dipteron parasites, followed by a placement at the University of Adelaide, where she worked on ant communities in the South Australian Outback. Her doctorate was in wetland ecological entomology at the University of Roehampton. During her time researching this topic, she turned to the taxonomic expertise that was housed in the Natural History Museum (NHM), London, and volunteered with them after she had completed her thesis.

After a period of lecturing in ecology, entomology, and biostatistics, mostly at Roehampton but also guest lecturing at various other universities, Erica secured some contract work at NHM. This turned into a maternity cover position, which in turn led to a full-time job in the Diptera Section in 2006, where she is now a senior curator. At the museum, Erica is responsible for the lower Brachycera, the Mycetophilidae, and the Culicidae, and she recently has taken on the Siphonaptera (flea) collection.

Her research work is broad and varied and has included mosquito projects both in the UK and abroad, Asilidae in South Australia, and bat flies (and other Diptera) from Dominica. She also is an avid promoter of museum collections in the research and development of novel methods for utilizing old specimens for new research. She is a guest lecturer on two different master's courses and hosts numerous students in the department.

Very much involved with public outreach, Erica has also appeared on TV, radio (including presenting the series “Who’s the Pest?” on Radio 4), and numerous podcasts, and she has given talks at science festivals, international nature fairs, and wildlife organizations, promoting flies and the research undertaken at the museum. She is president of the Amateur Entomology Society (UK) and sits on the committee for the Dipterists Forum (UK) and the International Congress of Diptery. In 2016, her first book, *The Secret Life of Flies*, was published—a popular science book introducing flies to a new age; the book has received international acclaim.

Antlion Pit Competition



● DEMONSTRATION DAY

Monday, November 18
9:00 – 11:00 AM
Exhibit Hall 1 & 2, America's Center

Meet the finalists of the Antlion Pit before the competition and get a glimpse of what will be presented at the finals. All finalists will exhibit their innovations in the Exhibit Hall and are looking forward to meeting you and hearing your feedback.

● ANTLION PIT PRESENTATION SESSION

Monday, November 18 • 1:00 – 3:00 PM
America's Ballroom, America's Center

Don't miss out on the inaugural Antlion Pit Competition! It is going to be a thrilling and lively session where six finalists will compete for \$10,000 in prize money. Come and be a part of the excitement to see who survives the Antlion Pit!

ESA Awards Breakfast Featuring the Founders' Memorial Lecture

Tuesday, November 19 • 7:30 – 8:45 AM
America's Ballroom, America's Center

Join us in congratulating all our award winners at this year's awards breakfast. Help recognize your colleagues and peers for their outstanding achievement. All ESA Professional Awards, ECP Awards, and ESA Certification Corporation winners will be recognized. Complimentary coffee, tea, and breakfast "light bites" will be offered to all attendees.

● FOUNDERS' MEMORIAL LECTURE

“Tom Eisner: An Incorrigible Entomophile and Innovator Par Excellence”



Walter S. Leal is a Distinguished Professor of Molecular and Cellular Biology at the University of California (UC-Davis), and former chair and professor of the Department of Entomology, UC-Davis. He holds a B.Eng. in chemical engineering (Universidade Federal de Pernambuco), and both M.Sc. in agricultural chemistry (Mie University) and Ph.D. in applied biochemistry (Tsukuba University) degrees from Japan. He is the first

non-Japanese individual to obtain tenure with the Japanese Ministry of Agriculture, Forestry, and Fisheries, and he was head of the Laboratory of Chemicals Prospecting at the National Institute of Sericultural & Entomological Science. During his tenure in Japan, Leal spent a sabbatical at Cornell with Jerry Meinwald—Tom Eisner's longtime collaborator. Along with his “twin brother” and current ESA vice president Alvin Simmons, Leal served as co-chair of the 2016 International Congress of Entomology. He served ESA as president of then-IPMIS (now PBT), secretary and vice chair of then-Section B, and member of various committees. He has been elected to the Brazilian Academy of Sciences and the California Academy of Sciences. Leal is an Honorary Fellow of the Royal Entomological Society, Fellow of the American Association for the Advancement of Science, and ESA Fellow. He also is recipient of the Nan-Yao Su Award, Silver Medal from the International Society of Chemical Ecology, Medal of Science from the Entomological Society of Brazil, Gakkaisho (ESA Fellow equivalent) from the Japanese Society of Applied Entomology and Zoology, and the Technology Prize from the Japan Society of Bioscience, Biotechnology, and Agrochemistry. This year, he proudly received the ESA “20-Year-Member” lapel pin.

Student Awards Ceremony

Tuesday, November 19 • 6:30 – 7:30 PM
America's Ballroom, America's Center

The winners of the President's Prize, ESA Student Awards, Student Debates, and Linnaean Games will be recognized. After the conclusion of the program, students are invited to head over to the Student Reception additional information can be found on page 17.

Closing Plenary Session and Member Town Hall

Wednesday, November 20 • 8:00 – 9:00 AM
America's Ballroom, America's Center

Join our Governing Board and top leaders of the Society as we close out Entomology 2019 and hear from Alvin Simmons, ESA's 2020 president on his vision for the upcoming year. A member town hall forum will take place towards the end of the session. Come and share your thoughts about the future of the society.

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Student Activities

Linnaean Games

Preliminary Round: Sunday, November 17 • 1:00 – 3:00 PM
America's Ballroom, America's Center

Final Round: Tuesday, November 19 • 5:00 – 6:30 PM
America's Ballroom, America's Center

Be sure to check out the Linnaean Games, a "College Bowl"-type competition that is one of the more spirited sessions of our annual meetings. Stop in and cheer on your favorite team!

Student Competition for the President's Prize

Monday, November 18
Various times and locations, America's Center

A full list of presentations for all formats of the Student Competition can be found starting on page 91. Stop by and show your support for the students!

Student Debates

Tuesday, November 19 • 1:00 – 4:00 PM
America's Ballroom, America's Center



Synergisms in Science: Climate Change and Integrated Pest Management (IPM) through the Lens of Communication. All three debates will be interesting, informative,

and entertaining. Audience members are welcome to ask questions at the end of each debate. Come cheer on your favorite team!

Student Reception

Tuesday, November 19 • 8:00 – 11:00 PM
Ballpark Village, 601 Clark Avenue



All registered students and recent graduates are invited to attend—please be sure to have your ID and name badge as proof of registration.



Student Reception at Ballpark Village

Tuesday November 19, 2019

8:00 PM – 11:00 PM

601 Clark Ave, St. Louis, MO 63102

In the heart of St. Louis, Ballpark Village is where sports and entertainment meet. Mix and mingle with your friends as you explore all that the venue has to offer. All registered student and recent graduates are invited to attend. Please bring your ID and name badge as proof of student registration.

University Entomology Clubs

Club representatives will be available to sell T-shirts and more in ESA's Exhibit Hall (Exhibit Hall 1 & 2) during normal hall hours. As of August 2019, the list of clubs participating includes the following:

- C.V. Riley Entomological Society at the University of Missouri-Columbia
- H. Garman Entomology Club (University of Kentucky)
- Michigan State University's Graduate and Undergraduate Entomology Student Society
- North Carolina State Entomology Graduate Student Association
- Penn State Entomology Graduate Student Association
- Popenoe Entomology Club from Kansas State University
- Texas A&M University Entomology Graduate Student Organization
- The Ohio State University-Entomology Graduate Student Association
- University of California, Riverside-Entomology Graduate Student Association
- University of Maryland Entomology Student Organization
- University of Nebraska-Lincoln

Social Events

Everyone has the opportunity to network at numerous receptions throughout the week. Monday night is the traditional time for receptions, with no scientific sessions scheduled for the evening.

Early-Career Professionals (ECP) Reception

Tuesday, November 19 • 8:00 – 9:30 PM
Shark Bar at Ballpark Village (601 Clast Avenue)

Join your fellow early-career professionals for an off-site networking event. Connect with other recent graduates to share experiences and advice in navigating ESA and your career.

LGBTQIA+ Mixer

Monday, November 18 • 8:00 – 10:00 PM
Benton, Marriott Grand

Lesbian, Gay, Bisexual, Trans, Queer, Intersex, Asexual (LGBTQIA+) and allies are welcome to our reception.

Sponsored by:



Join ESA in person in 2020!

With two joint Branch meetings and a virtual symposium, we have something to offer all our members throughout the year.



Joint North Central Branch and Southwestern Branch
March 15-18
Oklahoma City, OK



Joint Eastern Branch and Southeastern Branch
March 29 – April 1
Atlanta, GA



Pacific Branch
April 19-22
Spokane, WA



International Branch
Virtual Symposium
April 27-29

Plan to cap off the year in sunny Orlando, Florida for our premier event, Entomology 2020: Entomology for All!



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Learn more at entsoc.org/meetings



Social Hour with Poster and Infographic Presenters

Join us for Social Hour with Poster and Infographic Presenters each day of the meeting during poster presentation hours in Exhibit Hall 1 & 2. Cash bars will be available.



● STUDENT COMPETITION POSTERS AND INFOGRAPHICS

Monday, November 18
5:30 – 6:30 PM

● CONTRIBUTED POSTERS AND INFOGRAPHICS

Tuesday, November 19
5:30 – 6:30 PM
Wednesday, November 20
12:30 – 1:30 PM



Student Reception

Tuesday, November 19 • 8:00 – 11:00 PM
Ballpark Village (601 Clast Avenue)



All registered students are invited to attend—please be sure to have your ID and name badge as proof of registration.

Welcome Reception

Sunday, November 17 • 7:30 – 9:30 PM
Exhibit Hall 1 & 2, America's Center

You are cordially invited to attend the Welcome Reception on Sunday evening in Exhibit Halls 1 & 2 immediately following the Opening Plenary Session (America's Ballroom). This is a great opportunity to have time with the exhibitors and colleagues and learn about the latest resources and tools available to entomologists.

Women and Allies in Entomology Breakfast

Monday, November 18 • 6:30 – 7:50 AM

America's Ballroom, America's Center

*Fee: \$28 for first 150 tickets sold / \$33 after the discount is exhausted

*Complimentary for the first 160 student and early-career professional members who arrive to the breakfast event on Monday morning. We are also celebrating the seventh anniversary of student and early-career sponsorship at the breakfast by Corteva Agriscience™.



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Each year since 1989, a growing group of entomologists (open to all) have met for breakfast to inspire and encourage more women to enter and remain in entomology and science. The breakfast environment is designed to mix career stages and bridge disciplinary silos to encourage networking, mentoring, and collegiality among established entomologists and those who are students or beginning their careers. The timing of the event, early in the meeting, is crucial to setting a tone that will last throughout the week and beyond. New this year, will be "3 for 3." We have asked 3 speakers to each share a 3-minute story about being a woman in entomology and what has kept them active and successful, even when faced with challenges. Our speakers this year will be:

- Dr. Neeta Connally, Western Connecticut State University
- Dr. Ana María Vélez Arango, University of Nebraska
- Dr. Patti Prasifka, Corteva Agriscience™

Help us find the future of our profession

Get involved with the Chrysalis Fund

Do you want to contribute to the future growth of entomology? Do you enjoy seeing young people spread their wings as future insect scientists? Then you'll want to know more about ESA's **Chrysalis Fund**. Your contributions to the Chrysalis Fund help to foster the future of entomology through grants to K-12 teachers and other educators who use insects in the classroom to get kids excited about science.

While you're in St. Louis, don't forget to:

- **Enter** the 2019 Chrysalis Fund raffle. Proceeds directly support insect education grants, and the grand prize is a VIP registration and travel package to Entomology 2020 in Orlando, Florida.
- **Attend** the STEMbugs Share Fair and the symposium "Growing the Next Generation of Entomology Advocates: A Focus on Entomology Education with Middle and High School Students."
- **Purchase** additional copies of the World of Insects Calendar for your friends, family, and colleagues. All proceeds from the calendar benefit the Chrysalis Fund.



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ESA Exhibitors

Exhibit Hall

The Exhibit Hall (Exhibit Hall 1 & 2, America's Center) will feature exhibitors, poster/infographics presentations, virtual posters/infographics, a cyber café, charging station, and student club tables. Coffee, lunch and other surprises will pop up in the hall. Our exhibitors have the latest entomological equipment, supplies, gifts, and reference materials. ESA Corporate Partners are highlighted in orange.

Exhibit Hall Hours:

Sunday, November 17 7:30 – 9:30 PM
 Monday, November 18 9:00 AM – 5:00 PM
 Tuesday, November 19 9:00 AM – 5:00 PM
 Wednesday, November 20 9:00 AM – 2:00 PM



Exhibitors (as of September 2019)

For a full listing of all of the exhibitor descriptions, download the mobile app and search for your favorite exhibitor.

26th International Congress of Entomology ICE2020 Helsinki Helsinki, Finland	Booth: 712 ice2020helsinki.fi	Conviron Winnipeg, MB, Canada	Booth: 405 conviron.com
Agdia Inc. Elkhart, IN	Booth: 519 agdia.com	Cornell University Press Ithaca, NY	Booth: 221 cornellpress.cornell.edu
Alpha Scents, Inc. West Linn, OR	Booth: 311 alphascents.com	Corteva Agriscience™ Agriculture Division of DowDuPont Indianapolis, IN and Johnston, IA	Booth: 307 corteva.us
art's IMPORTANT, LLC Tulsa, OK	Booth: 108 artsimportant.com	Dino-Lite Scopes Torrance, CA	Booth: 317 dinolite.us
Atlas Screen Printing Gainesville, FL	Booth: 121 wildcotton.com	Discover Life in America Gatlinburg, TN	Booth: 517 dlia.org
BASF Research Triangle Park, NC	Booth: 611 agriculture.bASF.com	EasyBehaviour Oeiras, Lisboa, Portugal	Booth: 704 flypad.rocks
Bayer Chesterfield, MO	Booth: 205 bayer.com	Elsevier Amsterdam, Netherlands	Booth: 222 elsevier.com
Bio Chambers Incorporated Winnipeg, MB, Canada	Booth: 410 biochambers.com	Entomological Society of America Annapolis, MD	Booth: 210 entsoc.org
BioQuip Products, Inc. Rancho Dominguez, CA	Booth: 114 bioquip.com	Eurofins Agroscience Services Prospect Hill, NC	Booth: 511 eurofins.com/agroscience-services
CABI/CSIRO Sterling, VA	Booth: 123 styluspub.com	Foldscope Instruments, Inc. Palo Alto, CA	Booth: 523 foldscope.com
Cambridge University Press New York, NY	Booth: 418 cambridge.org/academic	Frontier Scientific Newark, DE	Booth: 220 fsiag.com
Celestron Torrance, CA	Booth: 419 celestion.com	Gylling Data Management Brookings, SD	Booth: 413 gdmdata.com
Chirps Chips San Francisco, CA	Booth: 621 eatchirps.com		

Exhibitors

Hempstead Halide Inc. Galveston, TX	Booth: 512 hempsteadhalide.com	SciBugs Glastonbury, CT	Booth: 520 scibugs.info
Hitachi High Technologies America, Inc. Clarksburg, MD	Booth: 305 hitachi-hightech.com/us	Sigma Scientific, LLC New York, NY	Booth: 604 springernature.com
i2LResearch Cardiff, United Kingdom	Booth: 616 i2LResearch.com	Spectrum Brands Booth: 407 Earth City, MO	spectrumbrands.com/brands/home-and-garden.html
Insects MDPI Basel, Switzerland	Booth: 319 mdpi.com/journal/insects	Springer Nature Micanopy, FL	Booth: 521 SigmaScientificLLC.com
ISCA Technologies Riverside, CA	Booth: 510 iscatech.com	Stacie Jensen Studios Ballwin, MO	Booth: 706
JF Oakes LLC Yazoo City, MI	Booth: 518 jfoakes.com	Syngenta Greensboro, NC	Booth: 716 syngenta.com
Laudier Histology New York, NY	Booth: 320 laudierhistology.com	Texas Department of Agriculture—Don't Pack a Pest Program Austin, TX	Booth: 619 texasagriculture.gov
Loligo Systems Viborg, Denmark	Booth: 504 loligosystems.com	The Coleopterists Society Santa Barbara, CA	Booth: 421 coleopsoc.org
Macroscopic Solutions, LLC Tolland, CT	Booth: 313 macroscopicsolutions.com	The Resource Shop, Inc. Palatka, FL	Booth: 516 jeffmcgovern.com
NIGHTSEA Lexington, MA	Booth: 411 nightsea.com	Trécé, Inc. Adair, OK	Booth: 404 trece.com
Oxford University Press New York, NY	Booth: 323 oup.com/us	Union Biometrica, Inc. Holliston, MA	Booth: 416 unionbio.com
Penn State University University Park, PA	Booth: 613 agsci.psu.edu/research/commercialization	University of Florida, Doctor of Plant Medicine Booth: 420 Gainesville, FL	dpm.ifas.ufl.edu
Percival Scientific, Inc. Perry, IA	Booth: 321 percival-scientific.com	University of Maryland Department of Entomology Booth: 412 College Park, MD	entomology.umd.edu
PhbeaD, LLC Paint Lick, KY	Booth: 605 phbead.com	University of Maryland Insect Transformation Facility Booth: 618 Rockville, MD	ibbr.umd.edu/facilities/itf
Princeton University Press Princeton, NJ	Booth: 620 press.princeton.edu	Virginia Tech Booth: 417 Blacksburg, VA	ento.vt.edu
Rad Source Technologies, Inc. Buford, GA	Booth: 505 radsource.com	USDA APHIS PPQ Booth: 223 Honolulu, HI	
Rose Micro Solutions West Seneca, NY	Booth: 617 rossemicrosolutions.com	Zantiks, Ltd. Booth: 607 Cambridge, United Kingdom	zantiks.com
Ross Lifescience Pvt. Ltd. Pune, Maharashtra, India	Booth: 606 rosslife.net		

Awards Hall of Fame

Please help us recognize these outstanding individuals at the associated events listed below.

Opening Plenary Session

Sunday November 17 • 5:30 PM – 7:30 PM
America's Center, America's Ballroom

HONORARY MEMBERS

Frank Gilstrap
Scott Hutchins
Sonny Ramaswamy

ESA FELLOWS

David Andow
Gerhard Gries
Bert Hölldobler
Gene R. Kritsky
Raymond J. St. Leger
Shu-Sheng Liu
Phillip Mulder
Rick Roush
Blair Siegfried
Steve D. Wratten

Awards Breakfast Featuring the Founders Memorial Lecture

Tuesday, November 19 • 7:30 AM – 8:45 AM
America's Center, America's Ballroom

ESA PROFESSIONAL AWARDS

Silvia Rondon, Award for Excellence in Integrated Pest Management (sponsored by Syngenta Crop Protection, Inc.)
Surendra Dara, Distinguished Achievement Award in Extension
Allan Felsot, Distinguished Achievement Award in Teaching
Gerhard Gries, Nan-Yao Su Award for Innovation and Creativity in Entomology

EARLY CAREER PROFESSIONAL AWARDS

Alison Gerken, Henry & Silvia Richard Research Grant
Joe Louis, Early Career Innovation Award
Erika Machtlinger, Early Career Professional Extension Award
Heather Grab, Early Career Professional Research Award
Elizabeth Murray, Early Career Teaching Award

ESA CERTIFICATION AWARDS

Travis Aggson, ACE, ACE Professional Award

Student Awards Ceremony

Tuesday, November 19 • 6:30 PM – 7:30 PM
America's Center, America's Ballroom

ESA STUDENT AWARDS

Amy Geffre, The Larry Larson Graduate Student Award for Leadership in Applied Entomology (sponsored by Corteva™ Agriscience Agriculture Division of DowDuPont)
Yan Yan, Lillian & Alex Feir Graduate Student Travel Award in Insect Physiology, Biochemistry, or Molecular Biology
Casey Parker, Student Activity Award (sponsored by Bayer)
Ashley Kennedy, ESA Student Certification Award (sponsored by PestWest Environmental Science)

JOHN HENRY COMSTOCK AWARDS

Ethan Degner, Eastern Branch
Seunghyun Lee, International Branch
Ryan Schmid, North Central Branch
Brendon E. Boudinot, Pacific Branch
Lina Bernaola, Southeastern Branch
Jocelyn R. Holt, Southwestern Branch

Congratulations to this year's award winners!

Opening Plenary: Sunday, November 17 • 5:30 PM

Honorary Members and ESA Fellows

Honorary Members and ESA Fellows will be honored during the Opening Plenary Session With Keynote by Erica McAlister on Sunday, November 17, 2019, 5:30 – 7:30 PM, America's Center, America's Ballroom.



ESA Honorary Members

Honorary membership acknowledges those who have served *ESA* for at least 20 years through significant involvement in the affairs of the Society that has reached an extraordinary level. Candidates for this honor are selected by the *ESA* Governing Board and then voted on by the *ESA* membership.



Frank Gilstrap, Ph.D., professor emeritus in the Entomology Department at Texas A&M University, researched biological control of insects and mites damaging small grains, field crops, and fruit. He earned a B.A. (1968) in biology from Fresno State College and M.S. (1971) and Ph.D. (1974) degrees in entomology from the University California—Riverside. Gilstrap researched (1974-2008) in the United States, Africa, and Central America; generated \$4.25 million in funding; graduated 14 M.S. and 14 Ph.D. students; and published 237 articles and reports (83 refereed, 31 in *ESA* journals). As AgriLife Research associate director (1996-2003), Gilstrap managed intellectual property, \$5 million in appropriated funds, and Texas commodity relationships. As Dallas Urban Solutions Center director (2005-2010), he created and implemented a business-based management model for the Center, established more than 60 partnerships, and grew annual Center revenue from \$250,000 (2000-2005) to \$2.1 million (2011).

An *ESA* member since 1972, Gilstrap was 2006 *ESA* president; 2003 president of the Entomological Foundation (EF); 2000-2007 *ESA* Governing Board member; 1997-2003 EF Board of Counselors and EF Board of Directors member; 1995-1998 Certified Entomologists Board member; 1995 *ESA* Poster Sessions chair; 1994 *ESA* Program Committee chair; 1993 *ESA* Student Competition for the President's Prize chair; 1993 *ESA* Section C chair; 1991 president of the American Registry of Professional Entomologists, Central Texas Chapter; 1987 *Journal of Economic Entomology* Editorial Board chair; 1982 *ESA* Subsection Ca chair; 1980 *ESA* Southwestern Branch Program Committee chair; member of 10-plus other *ESA* committees; and 1979 Southwestern Entomological Society president.



Scott H. Hutchins, Ph.D., BCE, was sworn in as deputy undersecretary at the U.S. Department of Agriculture (USDA) in January 2019, with responsibilities for research, education, and economics. Prior to USDA, Hutchins worked at Corteva AgriScience (previously Dow AgroSciences) for 32 years, where he held a wide range of roles in field science, project leadership, human resources, and product development, and ultimately served as global R&D leader. Hutchins holds degrees from Auburn University, Mississippi State University, and Iowa State University, all in entomology. He has authored or co-authored more than 100 refereed articles, reviews, and scientific presentations.

Throughout 38 years of *ESA* membership, beginning with the North-Central Branch (NCB) Student Affairs Committee, Hutchins has been a passionate and consistent contributor and leader to the Society. As a young professional, he served on or chaired multiple NCB committees over multiple years, leading to his election as NCB's *ESA* Governing Board representative for two terms. Hutchins was elected as *ESA* president in 2007, where his focus was to lead the Society to conceive, design, and ultimately implement a "renewal" and restructuring, including a comprehensive rewrite of its bylaws. Supported by membership, the result has been greater impact, relevancy, and financial security, leading to significant growth and diversity in membership. He has continued to serve *ESA* by working with Section leadership on their strategic planning and impact. Hutchins also has been an active contributor to the *ESA* Certification Board and the Entomological Foundation and was elected as an *ESA* Fellow in 2009.



Sonny Ramaswamy, Ph.D., is president of Northwest Commission on Colleges and Universities, which accredits institutions in Alaska, Idaho, Montana, Nevada, Oregon, Utah, Washington, and British Columbia. Previously, President Barack Obama appointed Sonny to direct the National Institute of Food and Agriculture. He has also served as dean of Oregon State University's College of Agricultural Sciences, director of Purdue University's Agricultural Research Programs, university distinguished professor and head of entomology at Kansas State University, and professor of entomology at Mississippi State University. Sonny's B.S. (agriculture) and M.S. (entomology) are from the University of Agricultural Sciences, Bangalore; his Ph.D. (entomology) is from Rutgers.

He has been active in *ESA* since 1976 and has attended almost every annual and branch meeting, presented papers, organized symposia, judged and coached Linnaean Games and student presentations, served on journal editorial boards and the Publications Council, reviewed *ESA* journal papers, served as chair and member of numerous committees, and helped develop *ESA*'s website policy. He helped establish *ESA*'s electronic publications policy; the first *ESA* paper published online, including reprints, was Sonny's.

As a member of the Council of Entomology Department Administrators, Sonny worked to help *ESA* rethink its priorities and culture to become more member-supportive and helped develop white papers to address societal challenges. He helped *ESA* develop effective engagement with the executive and legislative branches of the federal government, agencies, National Academy of Sciences, and various NGOs in Washington, D.C., resulting in the formation of *ESA*'s Science Policy Committee and Science Policy Fellows program.

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Honorary Members and ESA Fellows



ESA Fellows

The designation of *ESA Fellow* recognizes individuals who have made outstanding contributions to entomology.



Dr. David Andow, a Distinguished McKnight University Professor in the Department of Entomology, University of Minnesota, was elected as Fellow in 2019. He is internationally known for his research on insect population and community ecology, risk assessment of invasive species and genetic engineering, and management of resistance in insects.

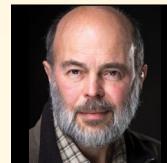
Professor Andow was born in Ohio and attended Brown University, majoring in biology (Sc.B., magna cum laude). He obtained his Ph.D. in ecology and evolution at Cornell University (1982) under the direction of David Pimentel and Simon Levin, investigating the ecological mechanisms affecting insect response to vegetational diversity. He then received a National Science Foundation postdoc to study rice insects with Keizi Kiritani at the National Institute of Agro-Environmental Sciences in Tsukuba, Japan. Following this, he had a short postdoc at Cornell reviewing the environmental risks of genetic engineering. He took his present position in 1984 and serves on the graduate faculties of entomology, ecology, conservation biology, sustainable agriculture, and natural resource policy and management.

Andow's research in insect ecology is diverse. His 1991 review on arthropod response to vegetational diversity has received over 1,600 citations and remains actively cited today. His work to extend the diffusion model for the spread of invasive species opened up basic and applied research to model and manage invasive species. His modelling work and reviews have influenced efforts to design and implement effective insect resistance management, and the F2 screen, which estimates resistance allele frequencies for recessive and nearly recessive resistance in natural populations, has been used worldwide. His publications in sustainable agriculture have supported the view that SA systems are highly integrated and insects play critically important roles. He led the early efforts to develop and implement the recovery of the federally endangered Karner blue butterfly, and he has published extensively on environmental risks of genetically engineered organisms and the ecology of natural enemies, especially coccinellids and Trichogramma wasps. More recently, he has worked on the landscape ecology of pentatomids as well as on the use of next-generation sequencing to understand food web structure.

Andow has published more than 193 peer-reviewed scientific papers and 92 book chapters, edited 13 books, co-authored seven consensus reports for national and international organizations, and given 242 invited presentations. He has graduated seven M.Sc. and 10 Ph.D. students and mentored nine postdoctoral/visiting scientists. He was the King/Chavez/Parks Visiting Professor at the University of Michigan, and he won the Best Publication in Landscape Ecology from the International Association for Landscape Ecology. He was an OECD Fellow, a McMaster Fellow, a Japanese Society for the Advancement of Science Fellow, and a Bellagio Center Fellow. He has consulted for the Pontifical Council for Justice and Peace

(Vatican), World Trade Organization, World Health Organization, European Food Safety Authority, Ministry of Agriculture, Forestry and Fisheries (Japan), U.S. National Academy of Sciences, USDA, and US-EPA.

His son Lucas is a double major in comparative literature and Portuguese at the University of Minnesota, and his wife Debora is a research scientist in molecular entomology at the Brazilian Agricultural Research Corporation.



Dr. Gerhard Gries, a professor in the Department of Biological Sciences at Simon Fraser University (SFU), Burnaby, British Columbia, Canada, was elected Fellow in 2019. His laboratory is internationally known for the study of multimodal insect communication signals and foraging cues,

and for the development of semiochemicals for monitoring and control of pest insects.

Gries was born in Duderstadt, Germany, in 1955. He obtained his high school degree from the Duderstadt Gymnasium in 1974. After 15 months of military service, he studied forstwissenschaften (forest sciences) at the Georg-August-Universität in Göttingen in Germany. In 1984, he received his Ph.D. in forest entomology. Supported by a postdoctoral fellowship from the Deutsche Forschungsgemeinschaft, he joined Dr. John Borden's laboratory at SFU in 1986. After a two-year limited-term appointment, he became a tenure-track faculty member in 1991, reaching the rank of full professor in 2000. He is currently in the 16th year of an industrial research chair on multimodal animal communication ecology, supported by BASF, Scotts Miracle-GRO, and the Natural Sciences and Engineering Research Council of Canada.

The Gerhard and Regine Gries Lab elucidates multimodal communication signals and foraging cues in a wide variety of arthropods (Araneae, Coleoptera, Diptera, Dictyoptera, Hemiptera, Hymenoptera, Lepidoptera, Phasmatodea, Strepsiptera, Thysanura). The lab is particularly well known for identifying vanishingly small amounts of pheromones produced by moths and gall midges. Other breakthroughs revealed the role of sound, vibration, light, and magnetic fields in arthropod communication. For example, the lab has recently shown "how flies are flirting on fly" in that some fly families use light flashes reflected off their wings in sexual communication, which was previously entirely unknown.

Gries has graduated 57 students, published 273 peer-reviewed research articles, been granted 15 patents, and produced 13 scientific films on beetles, hoverflies, and aphids in collaboration with the Institute of Scientific Film in Germany. He has received over \$11 million of research support as a principal investigator and currently runs a large laboratory with 13 graduate students, three research associates, and many undergraduate students, often recruited from his insect biology class.

Gries has presented 61 invited presentations at local, national, and international meetings. He has received the *ESA Award in Insect Physiology, Biochemistry, and Toxicology* (2016), the *Entomological Society of Canada Gold Medal* (2017), the *ESA (Pacific Branch) Woodworth Award* (with Regine Gries, 2017), and *ESA's Nan-Yao Su Award for Innovation* and

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Honorary Members and ESA Fellows

Creativity in Entomology (2019). He was elected Fellow of the Entomological Society of Canada in 2018. As well as being a curiosity-driven researcher, Gries is a passionate teacher. His teaching of entomology and ecology courses has been recognized with an SFU Excellence in Teaching Award (1994). Gries has also mentored many undergraduate research assistants and has co-authored peer-reviewed papers with more than 50 of them. In 2019, he received the ESA (Pacific Branch) Distinction in Student Mentoring Award.

Gries considers it his hobby to run a large and diverse research program with many bright and enthusiastic students. Other hobbies are flower gardening and wildlife photography.

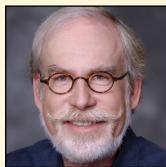


Dr. Bert Hölldobler (Hoelldobler), a German-American biologist, was born in the Bavarian village Erling-Andechs, Germany. He received his academic education at the universities of Würzburg and Frankfurt where, in 1971, he became professor of zoology. He is currently University Professor of Life Sciences, Regents' and Foundation Professor, at Arizona State University (ASU). Before joining ASU, he was the Alexander Agassiz Professor of Zoology at Harvard University, Cambridge, Massachusetts (1973–1990), and he held the chair of behavioral physiology and sociobiology at the University of Würzburg, Germany (1989 – 2004). From 2002 to 2008, he was appointed Andrew D. White Professor-at-Large at Cornell University, Ithaca, New York.

Hölldobler studies the diversity of social organization in insects, ants in particular, which primarily serve as models for his work in the fields of behavioral physiology, communication biology, chemical ecology, behavioral ecology, sociobiology, and evolutionary biology. This multifaceted research has resulted in many new discoveries about multimodal communication and orientation behavior in animals, the dynamics of social structures, and the evolution of animal communities. He has published more than 300 scientific papers, essays, and book chapters and co-authored seven books. He mentored more than 60 doctoral students and postdocs, more than 30 of whom have gone on to productive careers in academia worldwide.

Hölldobler is a member of several national and international academies, among them the German National Academy of Sciences (Leopoldina), the American Philosophical Society, the American Academy of Arts and Sciences, and the National Academy of Sciences (USA), and he served on many self-governing academic committees in Europe and the United States. He is the recipient of many awards and prizes, among them the Gottfried Wilhelm Leibniz Prize of the German Science Foundation, the Cothenius Medal, the highest recognition of the German National Academy of Sciences, and the Pulitzer Prize (jointly with Edward O. Wilson).

Hölldobler enjoys visiting art museums and galleries and is himself an accomplished artist. He also enjoys music, from baroque, classic, to jazz, but also folk music around the world.



Dr. Gene R. Kritsky, a professor of biology and dean of the School of Behavioral and Natural Sciences at Mount St. Joseph University, was elected as an ESA Fellow in 2019. He is internationally recognized for his research on periodical cicadas and the history of science.

Kritsky was born in Minot, North Dakota, in 1953. He attended Indiana University from 1971 until 1974, where he studied under Dr. Frank N. Young Jr. He entered the Department of Entomology at the University of Illinois as a university Fellow in 1974. He completed his M.S. in entomology in 1976 and his Ph.D. a year later in 1977, working with Dr. Lewis J. Stannard Jr. on the taxonomy of the Enicocephalidae, mapping the broods of periodical cicadas, and studying the history of science. He joined the Department of Biology at Tri-State University (now Trine University) as assistant professor of biology in 1977 and was promoted to associate professor in 1980. He was a Fulbright Scholar in Egypt from 1981 to 1982, where he taught at Minya University and researched the use of insects as a hieroglyphic motif. He accepted the position of associate professor of biology at the College of Mount St. Joseph in Cincinnati in 1983, becoming chair of biology in 1985, and was promoted to professor of biology in 1987. He was appointed dean of the School of Behavioral and Natural Sciences in 2016.

Kritsky's research interests include the evolution of the broods of periodical cicadas, the history of apiculture, Charles Darwin and his contributions to entomology, insects in art history, and the distribution of tiger beetles. His 246 publications include 10 books. His 1999 prediction of a four-year acceleration of Brood X in 2000 proved true and permitted the verification of a self-reproducing, off-cycle cicada emergence. Kritsky also discovered a previously unrecognized brood of 13-year cicadas in Ohio and Kentucky in 2004. His ESA publication on Darwin's Madagascan hawk moth prediction was selected by several organizations as one of the top zoology news stories of 1993. Kritsky's book *The Quest for the Perfect Hive* challenged the beekeeping industry to re-examine hive designs and practices to develop new innovations that could help deal with the many problems facing beekeeping today. His second book on apicultural history, *The Tears of Re*, was the first standalone review of beekeeping in ancient Egypt.

Kritsky served as editor-in-chief of *American Entomologist* for 15 years. He presented the ESA Founders' Memorial Award Lecture in 2012 and was elected as an Honorary Member of ESA in 2017. Kritsky is a Fellow of the American Association for the Advancement of Science and the Indiana Academy of Science, and he has received Distinguished Scholar Awards from both the Indiana Academy of Science and from Mount St. Joseph University.

His wife, Jessee Smith, is an artist and metalsmith whose insect-inspired designs have been featured in juried shows and exhibited at ESA meetings. She received the Mount St. Joseph Distinguished Art Alumni Award, the John Nartker Medal, in 2019.

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Honorary Members and ESA Fellows



Dr. Raymond J. St. Leger, a Distinguished University Professor in the Department of Entomology at the University of Maryland (UMD), was elected as Fellow in 2019. He is internationally known for his research on insect pathogenic fungi and the development of applications for insect pathogens against disease vectors and agricultural pests.

Professor St. Leger was born and brought up in London, England. He received a B.Sc. in biology from the University of Exeter in 1978, an M.Sc. in entomology in 1980 from Birkbeck College London University, and his Ph.D. in 1985 from the University of Bath. After graduation, St. Leger worked on fungal pathogens of insects with Donald Roberts (Boyce Thompson Institute) as a postdoc and Center scientist. He joined the entomology faculty at UMD in 1995 as an associate professor and attained the ranks of full (2001) and distinguished professor of entomology (2013).

St. Leger has published more than 150 scientific papers and book chapters, mostly directed toward using fungal parasites of insects as models for understanding how pathogens in general respond to changing environments, initiate host invasion, colonize tissues, and counter host immune responses. These investigations have also used highly accurate genome sequences to address the mechanisms by which new pathogens emerge with different host ranges. St. Leger's laboratory has altered insect pathogens in the genus *Metarhizium* so that they express genes encoding arthropod toxins or human antibody genes. The potential of these engineered pathogens to control vector-borne diseases such as malaria was successfully trialed in Burkina Faso. Other field trials are exploiting functional genomic tools to provide detailed knowledge of the evolutionary potential and invasion ecology of transgenic microbes and to predict the consequences of different types of human intervention (e.g., habitat fragmentation, climate change, invasive species, and genetically modified introductions). During these studies, St. Leger demonstrated that several very common insect pathogenic fungi colonize roots and have multiple beneficial effects on plant growth, besides killing insects. These observations have opened the way for using improved strains with customized properties to replace chemical pesticides and fertilizers.

St. Leger has been a consultant on biotechnology to many private and public concerns, nationally and internationally. He has presented more than 200 invited presentations at national and international conferences; he gave the Founders lecture at the 2009 Society of Invertebrate Pathology Meeting. He received UMD's Distinguished Scholar Teacher Award (2009) and the Kirwan Faculty Research and Scholarship Prize (2015). St. Leger is an elected Fellow of the Royal Entomological Society of London (2011), AAAS (2012), and the American Academy of Microbiology (2013). He received the American Society for Microbiology Promega Biotechnology Research Award (2017) and was the inaugural recipient of the Tai Fung-Lan Award for International Cooperation from The Mycological Society of China (2016). St. Leger has an honorary doctorate from his alma mater, the University of Exeter (2018).

St. Leger has many interests besides biology, including astronomy, art, and history.



Dr. Shu-Sheng Liu, professor and former director of the Institute of Insect Sciences at Zhejiang University (ZJU), China, was elected as Fellow in 2019. He is internationally known for his research on integrated pest management (IPM) in vegetable crops and the interactions between whiteflies, whitefly-transmitted plant viruses, and their host plants.

Liu was born and grew up in the countryside of Hunan Province, China. Prior to his college study in 1974, he worked on a farm for three years. He majored in plant protection for his undergraduate study at Hunan Agricultural University (1974–1977), and then studied entomology for his postgraduate work at Zhejiang Agricultural University (1978–1980). In 1980, he was awarded a Chinese Ministry of Education scholarship to take further studies overseas and became the first overseas Ph.D. student from China's mainland in Australia. He did his Ph.D. research on biological control in the Australian National University and the Division of Entomology of the Commonwealth Scientific and Industry Research Organization. He obtained his Ph.D. in zoology from ANU in 1984 and returned to China in January 1984. Since then, he has worked as a faculty member at ZJU. He was promoted to full professor in 1991 and Qiu-Shi Distinguished Professor in 2007, and he served as director of the Institute of Insect Science from 1998 to 2007 and as deputy president, Academic Committee of ZJU, from 2012 onward.

Liu's research interests span from fundamental insect ecology to IPM. The research achievements of his team have contributed substantially to the understanding and utilization of beneficial insects in vegetable IPM. His team discovered that interspecific behavioral interactions play a unique role in facilitating whitefly invasions. In the meantime, his team revealed that whiteflies and the plant viruses the insects transmit may establish an indirect mutualistic relationship via their shared host plants, which facilitate whitefly numerical increase and, in turn, the spread of the viruses. Through a multidisciplinary approach, his team has worked in a pioneer role in unravelling the physiological and molecular mechanisms underlying the indirect mutualistic relationship between the whitefly vectors and whitefly-borne viruses.

Liu has published 330 articles in peer-reviewed science journals, 11 book chapters, and two books. He has mentored 42 Ph.D. and 40 M.Sc. students and worked as the senior lecturer of several undergraduate and postgraduate courses over the last 35 years. He has worked actively in professional societies, such as the Entomological Society of China and International Congress of Entomology (ICE), and served on the editorial boards of five Chinese and six English journals. Currently he is on the ICE Council and the Editorial Committee of Annual Review of Entomology. Among Liu's awards are ICE Certificate of Distinction (2004); Excellence in Teaching Award, ZJU (2008); Excellent National Scientist, Chinese Association of Science and Technology (2014); and University of California—Davis Storer Lectureship (2014).

Liu has been married to his wife, Li-Hua Chen, for over 40 years. Their son, Ming-Qi Liu, a biomedical scientist at Fudan University, lives in Shanghai. Liu is known among his colleagues and friends for his hobbies, including singing, playing the Chinese instrument erhu, calligraphy, tennis, and travelling.

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Honorary Members and ESA Fellows



Dr. Phillip Mulder, professor of entomology and department head of Oklahoma State University (OSU), was elected as an ESA Fellow in 2019. He is best known for extension work in several commodities, particularly pecan, and as department head at OSU for the past 12 years. As extension entomologist, he first reported on utility of the Circle trap, used in monitoring pecan weevil, *Curculio caryae* (Horn). As department head, Dr. Mulder and his team grew the undergraduate program at OSU from less than five students to nearly 70 students, recruiting double-digit enrollment in the major for the past seven years.

Phil was born in 1955, in Montgomery, Alabama, but began traveling the world at the age of 2 with his father (Air Force), mother, and sister. Even as a toddler, his interests in entomology were evident, as he spent hours outside in Japan playing with indigenous ants. When his father retired, the family moved to Michigan, where Phil attended Ferris State College and graduated in science education. He subsequently attended Iowa State University for graduate school under the direction of Dr. William B. Showers, USDA-ARS. He earned his M.S. and Ph.D. degrees from Iowa State University in 1981 and 1984, respectively. In 1985, he was hired by OSU as an area extension entomologist, transferred to the OSU main campus in 1995, and assumed statewide responsibilities for a number of commodities. Dr. Mulder attained the rank of associate professor in 2000 and professor in 2004.

Dr. Mulder served as advisor or co-advisor to four Ph.D. and nine M.S. students, and as a member of 16 M.S. and 11 Ph.D. student committees. Dr. Mulder has provided more than 2,500 extension, media outreach, and research presentations, and has authored or co-authored over 150 refereed publications, invited book chapters, extension publications, and research reports, including the first e-learning short course on pecan. He has obtained more than \$4 million in research and extension competitive funding and in 2004 was recognized by ESA with the Distinguished Achievement Award in Extension. Phil served as extension coordinator for the department before assuming responsibility as interim department head in 2007 and department head in 2009. He continues to oversee two disciplines, 27 faculty, nearly 100 students, four degree programs, and various budget and personnel issues.

Phil has been a member of ESA since 1979, serving in many capacities, including president of the Southwestern Branch ESA, co-chair of ESA Program Committee, and chair/games master of Linnaean Games for ESA. Phil served as ESA treasurer and, in 2015, as president of ESA. In 2016, he was president of the Entomological Foundation. Phil chaired the 2016 ESA Science Policy Capabilities Committee and helped select the first 10 Science Policy Fellows for ESA. Collectively, Phil served ESA Governing Board for 10 years. He is an Honorary Member of ESA and an Honorary Fellow of the Royal Entomological Society of London.

Phil and his wife, Lori, celebrated 43 years of marriage in 2019. They are parents of three children, Adam, Elizabeth (Libby), and Daniel, and five grandchildren.



Dr. Rick Roush, a professor in the Department of Entomology and dean of the College of Agricultural Sciences at Pennsylvania State University, was elected as Fellow in 2019. Rick is recognized internationally as a leading authority in research in resistance management to conventional insecticides, herbicides, and GM crops; biological control; and IPM. He is also recognized internationally as an academic administrator, with significant impacts in extension and sustainable management.

Roush was born and grew up in San Diego, California. He received a B.S. in 1976 and Ph.D. in 1979 in entomology from the University of California (UC)—Davis and UC—Berkeley, respectively, his Ph.D. with Professor Marjorie Hoy. He was a postdoctoral fellow at Texas A&M University with Professors S.B. Vinson and F.W. Plapp, then a faculty member at Mississippi State University (1981–1986), Cornell University (1987–1995), and University of Adelaide, Australia (1995–2003). While at Adelaide, he was selected as director and chief executive officer of the national Research Centre for Weed Management (1998–2003) before returning to UC—Davis as director of the statewide IPM Program (2003–2006). In 2006, Rick was appointed dean, University of Melbourne School of Land & Environment, and later appointed dean at Penn State (2014).

Roush's contributions in research have extended over four decades and resulted in more than 130 referred journal articles, books, and book chapters, as well as dozens of other articles for scientists and the general public. Roush has had a leading role in developing and implementing what have proven to be highly successful two-gene strategies for delaying resistance to Bt transgenic crops, including publishing a seminal modeling paper documenting the key features of what would make successful two-toxin crops. Roush then collaborated, beginning at Cornell with Elizabeth Earle and Anthony Shelton, to demonstrate IRM strategies using the diamondback moth and a Bt crucifer system. Also while at Cornell, his team identified the first-ever invertebrate GABA receptor while en route to identifying the mutations that confer resistance to cyclodiene insecticides, such as dieldrin. Roush has collaborated on and published more than 20 papers on predators, parasitoids, and biological control of insects and weeds, including two that have each been cited more than 300 times. He has served as major supervisor for 17 graduate students.

Roush has also had a significant impact through service on the Genetic Manipulation Advisory Committee in Australia from 1998 to 2003, and four scientific advisory panels for the U.S. Environmental Protection Agency. Roush has served on numerous boards and review panels, including the U.S. National Academy of Sciences Committee on Pesticide Resistance Management (1984–1985).

Rick became an Australian citizen in 2002 and continues to enjoy fishing in multiple forms and countries. Roush's son Peter is an electrical engineer on radio telescopes in Sydney with Australia's national science agency, the Commonwealth Scientific and Industrial Research Organisation. His daughter Alison is an educator with Keep South Australia Beautiful (KESAB), a leading NGO delivering environmental sustainability programs. With his wife Robyn Krause-Hale he shares a stepson, Matthew Hale, a stepdaughter, Stephanie Hanson, their spouses, and two grandsons.

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Honorary Members and ESA Fellows



Dr. Blair Siegfried, professor and chairman of the Entomology and Nematology Department at the University of Florida, was elected as Fellow in 2019. He is widely recognized for his research on insecticide resistance evolution and management as well as the environmental consequences of insecticide use.

Siegfried was born in Allentown, Pennsylvania, in 1959. He received his B.S. in biology from Lock Haven University (1981), where a summer internship at the Mountain Lake Biological Station fostered his interest in entomology and evolution. He earned his M.S. from the University of Florida in 1984, studying bark beetle chemical ecology, and his Ph.D. in entomology from Pennsylvania State University in 1989, where his research focused on the relationship of insect herbivory to insecticide susceptibility and resistance evolution. He also received postdoctoral training at Cornell University, where his interests in understanding insecticide resistance evolution became solidified. He was appointed assistant professor at the University of Nebraska in 1990, with research and teaching responsibilities in insecticide toxicology, and was promoted to associate professor in 1995 and full professor in 1999. In 2008, he was awarded a Charles Bessey Professorship for an exceptional record of distinguished scholarship or creative activity. In 2015, Siegfried moved to the University of Florida, where he assumed responsibility for administration of the Entomology and Nematology Department.

Siegfried's research interests involve fundamental questions about the evolution and management of insecticide resistance and the environmental impacts of pesticide use. To this end, he has secured more than \$10 million in funding from federal, corporate, and state agencies. His efforts have provided the foundation for establishing an internationally recognized program in resistance management and environmental protection that has attracted attention from industry to develop new technologies and from regulatory agencies seeking his advice on registration of these technologies. Over the course of his career, Dr. Siegfried's scholarship in research has resulted in 197 published peer-reviewed articles, 14 invited reviews and book chapters, and an additional 18 technical articles and proceedings. His work has resulted in two published patents, with an additional seven active patent applications.

During his nearly 30-year career, Siegfried has actively and broadly worked to promote the profession and visibility of entomology. His accomplishments include the direct influence and mentoring of 31 graduate students, 15 postdocs, and nine international scholars who have gone on to careers in academia, industry, and medicine. He has been actively involved with service and leadership and has participated on science advisory panels, international advisory boards, and numerous university committees. He has served ESA in a number of roles, most recently as vice president and president of the Physiology, Biochemistry, and Toxicology Section.

Siegfried has been married to Sidney Baum-Siegfried for 33 years, and his son Ethan resides in Lincoln, Nebraska, where he works for the public school system in special education. Siegfried and his wife enjoy exploring the waterways and coastal areas of North Florida and cultivating the natural diversity of his backyard.



Dr. Steve D. Wratten, Distinguished Professor of Ecology at Lincoln University and science leader at the Bio-Protection Research Centre in New Zealand, was elected as an ESA Fellow in 2019. He is a recognized world-leading researcher in agro-ecology, with a focus on the biological control of pests. He created the world's first and only biodiversity trails in vineyards and led the "beetle bank" team in the United Kingdom.

Steve was born in London, England. He attributes his interest in entomology to a school teacher who took him and others on "nature walks" after school. He received a B.Sc. (Hons), zoology, from the University of Reading in 1968, followed by a Ph.D. in ecology from the University of Glasgow in 1972 and an M.A. from the University of Cambridge. Steve went on to be awarded a D.Sc. from the University of Southampton in 1996. He was elected as a Fellow of the Royal Society of New Zealand in 2004. A further D.Sc. followed in 2006 from The University of Copenhagen, Denmark. He holds three doctorates and four professorships. He has won teaching, research, and communication awards. In 2019 he became a prestigious James Cook Fellow in New Zealand.

He is a proponent of using crop and non-crop plants to provide SNAP—shelter, nectar, alternative food, and pollen—to natural enemies of pests. This approach restores and enhances ecosystem services or "nature's services" in agriculture, thereby improving the environment and enhancing biological control of pests. He has pioneered the use of non-native and endemic New Zealand plant species in agriculture to enhance insect pest control and in this way reduce insecticide use. The methods developed by his team and trialed in the Waipara wine-growing region in Canterbury, New Zealand, are now in use in every vineyard region in New Zealand and Australia, as well as regions of the United States and Europe.

He has published approximately 400 journal articles, eight books, and 90 book chapters, and has supervised more than 90 Ph.D. students to completion. He has published papers in high-profile journals, including *Nature*, *Ecology*, *Ecology Letters*, *PNAS*, and *Proceedings of the Royal Society of London*. In 2014, he was named among the top 10 authors in the centenary editorial of the international journal *Annals of Applied Biology*.

Steve is an exceptional communicator of science and is frequently invited to speak at international conferences and workshops. He is a visiting professor at Charles Sturt University, Australia; Northwest Agriculture and Forestry University, China; and Fujian Agriculture and Forestry University, China.

Married to Claire, with two children and a large number of grandchildren, Steve also writes for print media in New Zealand at a rate of up to 40 columns each year. He is a mad birder—the most important book in his study is *Birds of the World*, which contains all of his global bird "ticks." He is also a keen vegetable gardener and worships Bob Dylan.

Awards Breakfast: Tuesday, November 19 • 7:30 AM

2019 ESA Professional, Early Career Professional and ESA Certification Corporation Awards

ESA Professional Awards, Early Career Professional Awards, and ESA Certification Corporation Awards will be recognized during the Awards Breakfast Featuring the Founders Memorial Lecture on Tuesday, November 19, 2019, 7:30 - 8:45 AM, America's Center, America's Ballroom.

ESA Professional Awards

Award for Excellence in Integrated Pest Management

This award, which is sponsored by Syngenta Crop Protection, recognizes outstanding contributions that have a direct relation to integrated pest management (IPM).

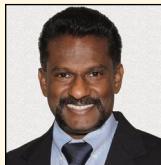


Dr. Silvia Rondon is a professor and extension entomology specialist at Oregon State University affiliated to the Hermiston Agricultural Research and Extension Center and the Department of Crop and Soil Sciences. She received her B.A. and M.S. degrees in entomology at the Agraria

University in Lima, Perú, and her Ph.D. in crop sciences at the University of Illinois at Urbana—Champaign, where she worked on the influence of different cropping systems on the population dynamics of the western corn rootworm (*Diabrotica virgifera virgifera* LeConte). In 2002, Dr. Rondon worked as a postdoctoral associate in the Horticulture Department at the University of Florida in Gainesville. In Florida, her main responsibility was to develop an integrated pest management program for field and greenhouse strawberries to reduce insecticide use. In 2005, Dr. Rondon joined Oregon State University. Her areas of expertise are pest management, insect distribution, population dynamics, insects-plant interactions, biological control, and chemical control. Her work involves various cropping systems including potatoes, onions, sweet corn, small fruits, and other high-value vegetables. She has over 150 peer-reviewed scientific and extension papers, book chapters, non-peer-reviewed publications, abstracts, and reports. She has brought more than \$36 million in private, state, and federal grants through her collaborations nationally and internationally. Dr. Rondon is currently working toward improving management of Lygus bugs, leafhoppers, and other pests affecting irrigated crops.

Distinguished Achievement Award in Extension

This annual award recognizes outstanding contributions to extension entomology.



Surendra Dara is the entomology and biologicals advisor with the University of California Cooperative Extension. He has a Ph.D. in entomology from Virginia Tech and a postgraduate diploma in applied information technology from Information Technology Institute, Canada. He has nearly 25 years of experience in IPM and microbial control, working on 17 species of invasive pests and diseases and several endemic species throughout his career. He has authored/co-authored 350 scientific and extension articles, which include three co-edited books, one co-edited special issue of a journal, 13 book chapters, and 50 peer-reviewed journal articles. He is currently working on addressing pest and disease issues of small fruits and vegetables with conventional and biological options, and finding alternative uses for entomopathogenic fungi as biofungicides and biostimulants. He has a strong research and extension program that develops innovative solutions for sustainable crop production and protection, and he reaches out to the agricultural community locally, regionally, and internationally. As a volunteer, he provided training in pest management, IPM, and crop production to farmers in Bangladesh, Haiti, Kosovo, Moldova, Mozambique, and Myanmar, and to visitors from Bosnia and Herzegovina, Bulgaria, and Colombia. He is currently serving on various committees or holding offices at the University of California, the Society for Invertebrate Pathology, the Entomological Society of America, and the Association of Applied IPM Ecologists. He publishes two e-journals and is a subject editor for the *Journal of Economic Entomology*. Dara was recently featured as a Western Innovator by Capital Press for his work in biologicals.

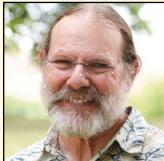
Awards Breakfast: Tuesday, November 19 • 7:30 AM

2019 ESA Professional, Early Career Professional and ESA Certification Corporation Awards



Distinguished Achievement Award in Teaching

This award is presented annually to the member of the Society deemed to be the most outstanding teacher of the year.

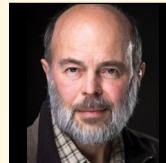


Dr. Allan Felsot is a professor in the Department of Entomology in the College of Agricultural, Human, and Natural Resource Sciences (CAHNRS) at Washington State University (WSU). He received his B.S. degree in biology from Tulane University and his M.S. and Ph.D. degrees in entomology from the University of Florida and Iowa State University, respectively. His current responsibilities at the Tri-Cities campus of WSU are divided among teaching, research, and extension while serving as academic director for math and science and as the graduate coordinator for environmental sciences. Dr. Felsot teaches across disciplines and video streams courses to the several academic campuses of WSU and the Research & Extension Centers. Course titles that he currently teaches include General Entomology, Ecological and Integrated Pest Management, Pesticides and the Environment, Biotechnology and the Environment, Plant Physiology, and The Ecosystem. Additionally, he has developed online versions of his IPM and pesticide courses for the WSU M.S. in agriculture online (Global Campus) degree. He also developed a third online-only course, Agricultural Chemical Technology for Crop Protection and Production. Dr. Felsot has received the WSU CAHNRS Excellence in Extension Award and the RM Wade Foundation Excellence in Teaching Award, and he was a member of the Urban IPM and Pesticide Safety Team that received the CAHNRS Team Interdisciplinary Award. Other honors include the ESA Founders Memorial Award and the American Chemical Society Agrochemicals Division Fellow Award. Dr. Felsot's philosophy of teaching promotes skeptical inquiry to challenge "authority" through examination and communication of evidence-based information. He encourages students to be curious about scientific and technological subjects and to read the primary research literature.



Nan-Yao Su Award for Innovation and Creativity in Entomology

Each year this award is given to an ESA member who is able to demonstrate through his or her projects or accomplishments an ability to identify problems and develop creative, alternative solutions that significantly impact entomology.



Gerhard Gries is a professor in the Department of Biological Sciences at Simon Fraser University (SFU). He received his Ph.D. in forest entomology from the Georg-August-Universität in Göttingen, Germany, in 1984. Supported by a postdoctoral fellowship from the Deutsche Forschungsgemeinschaft, he joined Dr. John Borden's laboratory at SFU in 1986. After a two-year limited-term appointment, he became a tenure-track faculty member in 1991, reaching the rank of full professor in 2000. He is currently in the 16th year of an industrial research chair on multimodal animal communication ecology, supported by BASF, Scotts Miracle-GRO, and the Natural Sciences and Engineering Research Council of Canada. The chair's research embraces most sensory modalities (olfaction, vision, audition, vibration, magnetoreception, infrared sensing). A recent highlight was the identification of the bed bug aggregation pheromone, comprising five volatile attractants and one nonvolatile arrestant. Gerhard has graduated 57 students, has published 273 peer-reviewed research articles (including more than 50 with undergraduate students as co-authors), has been granted 15 patents, and has produced 13 scientific films on beetles, hoverflies, and aphids in collaboration with the Institute of Scientific Film in Germany. He has received over \$11 million of research support as a principal investigator and currently runs a large laboratory with 13 graduate students, three research associates, and many undergraduate students, often recruited from his Insect Biology class. His passion for teaching was recognized by SFU in 1994 through an Excellence in Teaching Award and by a Distinction in Student Mentoring Award from the ESA (Pacific Branch) in 2019.

Awards Breakfast: Tuesday, November 19 • 7:30 AM

2019 ESA Professional, Early Career Professional and ESA Certification Corporation Awards

Early Career Professional (ECP) Awards



Henry & Silvia Richardson Research Grant

This grant provides research funds to postdoctoral ESA members who have at least one year of promising work experience, are undertaking research in selected areas, and have demonstrated a high level of scholarship.



Alison Gerken is a postdoctoral researcher with the USDA Agricultural Research Service in Manhattan, Kansas, where she researches stored product insect pest management and control. Alison grew up in South Dakota with an irrational fear of crickets but went on to study aggressive interactions between male stalk-eye flies while obtaining a B.S. in psychology and M.S. in biology from the University of South Dakota. She then went to Kansas State University for her Ph.D. work, where she studied the quantitative genetics of cold tolerance in *Drosophila*. Her work at the USDA focuses on a variety of behavioral, physiological, and genetic responses to pheromone lures, cold stress, insecticide-treated netting, mating disruption, competition among species, and the effects of diet on reproduction. Currently, Alison is working to develop a high-throughput system for quantifying the calling and oviposition behavior of *Plodia interpunctella* and *Trogoderma variabile* females in response to pheromones, to better understand the impacts of mating disruption on the females within a system. She is also leading a collaborative genetics project to understand the behavioral genetics of responses to pheromones in *Tribolium castaneum*. Alison enjoys science outreach and has served as a National Science Foundation GK-12 Fellow in a high school classroom, as a Boy Scout insect merit badge instructor, and as a member of the Communication and Outreach Early Career Professional Committee through the Genetics Society of America. She also enjoys mentoring students in the laboratory, guiding them in conducting their own research and asking interesting questions.



Early Career Innovation Award

This award honors young professionals working within the field of entomology who have demonstrated innovation through contributions within any area of specialization (research, teaching, extension, product development, public service, etc.).



Dr. Joe Louis is an associate professor in the Department of Entomology at the University of Nebraska—Lincoln (UNL). He received his B.S. in agriculture from Kerala Agricultural University (India), M.S. in entomology from Kansas State University, Ph.D. in molecular biology from the University of North Texas, and postdoctoral training at Pennsylvania State University. His research interests are to identify the key components/genes/signaling mechanisms that are involved in modulating plant defenses upon insect herbivory and to understand the mechanisms by which insect salivary proteins/effectors alter the plant defense responses.

Dr. Louis' research has produced more than 35 publications in several top-ranked plant science, entomological, and interdisciplinary science journals. His research program has been supported by nearly \$2.5 million in grant funds. Dr. Louis' research has also been recognized through a number of prestigious awards, including the Eric E. Conn Young Investigator Award from the American Society of Plant Biologists for his significant contributions to the field of plant-insect interactions as well as his demonstrated excellence in outreach, public service, mentoring, and teaching, and the Harold & Esther Edgerton Junior Faculty Award from UNL for demonstrating creative research, extraordinary teaching abilities, and academic promise. He was also recently awarded a \$1.5 million CAREER grant from the National Science Foundation. In addition to his research, Dr. Louis is involved in multiple education/outreach projects particularly including student populations underrepresented in science. At UNL, he also teaches two graduate-level courses: Insect Control by Host Plant Resistance and Chemical Ecology of Plant-Insect Interactions.

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2019 ESA Professional, Early Career Professional and ESA Certification Corporation Awards



ECP Extension Award

This award is given to a student transition or early professional who excels in entomological extension.



Dr. Erika Machtlinger is an assistant professor and extension educator in the Department of Entomology at the Pennsylvania State University. Dr. Machtlinger's extension expertise is medical and veterinary entomology, focusing on arthropod pest control in poultry, equine, and livestock facilities as well as ticks and tick-borne disease prevention and control. Her extension program includes local, regional, and national stakeholder presentations and workshops, online course development, learn-now videos, and publication of pest control guides and notices. Recently, Dr. Machtlinger and extension administration at Penn State established the Vector-Borne Disease Extension Team with the goal of reducing the transmission of tick-borne and other vector-borne diseases to animals and people in Pennsylvania through impactful education.

Dr. Machtlinger holds a B.S. from the University of Delaware in wildlife conservation and ecology and an M.S. and Ph.D. in entomology from the University of Florida. As the principal investigator for the Veterinary Entomology Laboratory at Penn State, Dr. Machtlinger's research focuses on arthropod pests of veterinary concern. The mission of the Veterinary Entomology Laboratory is to reduce the health risks to wild and domesticated animals associated with arthropod vectors and parasites. Current projects include understanding the ecology of mange infection in American black bears, understanding tick chemical ecology, and developing better fly control products for poultry facilities. She is an active member of ESA in the Medical, Urban, and Veterinary Entomology Section and serves on the ECP Committee as the MUVE representative.



ECP Research Award

This award recognizes a student transition or early professional who has made outstanding research contributions to the field of entomology.



Dr. Heather Grab received her bachelor's degree in biology from Ursinus College and her Ph.D. in entomology with Dr. Greg Loeb at Cornell University. Heather is currently a USDA NIFA Postdoctoral Research Fellow working with Dr. Katja Poveda at Cornell University.

Dr. Grab is broadly interested in understanding how environmental changes and species' traits affect the community composition and persistence of insects that provide important agricultural ecosystem services, including wild bees and natural enemies of crop pests. She integrates large-scale field experiments with methods from landscape ecology, community ecology, and phylogenetics to understand patterns in community variation and to reveal their consequences for crop productivity. Her work focuses on three areas. First, her research in the area of community phylogenetic ecology has revealed that land use change acts as a filter on different branches of the bee evolutionary tree, resulting in communities with more closely related species and overall lower pollination services in simplified landscapes. Second, her work has demonstrated the importance of landscape context in mediating the success of on-farm habitat restorations aimed at supporting beneficial insects. Recently, her research has focused on how trait variation within species responds to environmental stressors, including land use change and pesticides. Her research provides insights into the basic ecology of agriculturally important insects while delivering relevant recommendations for both conservation and applied insect management. Heather is active in extension and outreach and has taught multiple courses on quantitative methods and statistical modelling at Cornell. For more information, please visit her website, <http://www.landscap- agroecology.com/>.

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2019 ESA Professional, Early Career Professional and ESA Certification Corporation Awards



ECP Teaching Award

This award is given to a student transition or early professional who excels in entomological education.



Dr. Elizabeth Murray received her B.A. in biology from Gustavus Adolphus College in St. Peter, Minnesota. She completed her M.S. in entomology at Kansas State University and her Ph.D. in entomology at the University of California, Riverside. Her research background and interest in phylogenetics led her to join the Department of Entomology at Cornell University as a lecturer, where she designed and instructed a new course on applied phylogenetic methods: Model-Based Phylogenetics and Hypothesis Testing. She taught this course in 2015 and 2016, then taught Insect Diversity and Evolution in 2017.

Elizabeth incorporates broader scientific training and professional skills into her curriculum in addition to the course material. From her phylogenetics course, some students transferred their phylogenetic education into journal articles or dissertations. In her insect systematics course, she guided students through projects on developing species web pages on insects that occur on the Cornell University campus. In the classroom she uses discussions, peer-to-peer learning, and hands-on activities, with the objective of engaging students and presenting material for diverse learners.

Elizabeth Murray is currently a Peter Buck Postdoctoral Fellow at the National Museum of Natural History, Smithsonian Institution, in Washington, D.C. Starting in 2020, she will continue her research and course instruction as the Telford Family Professor and Director of the M.T. James Entomological Collection in the Department of Entomology at Washington State University.

ESA Certification Corporation Awards



ACE Professional Award

The purpose of the award is to recognize superior contributions of an ACE in the field of structural pest management.



Travis Aggson, ACE, serves as the executive vice president for American Pest Management Inc. in Manhattan, Kansas. If you ask his mom, his career started when he was 3 years old after he was attacked by a colony of ants. Officially, he started in the pest control industry when he was 14 years old, working with the termite crew in his hometown. Travis graduated from Kansas State University with a degree in business administration/finance. At Kansas State, he found a small family-owned pest control company that needed part-time help. Twenty-four years later, he is working with the same family that gave a hungry, baby-faced college student a chance.

Travis has served on several National Pest Management Association committees; he is a member of the Leadership Development Group, current chair of Marketing to Membership, and past chair of the Technical Committee. He also has served on the Pest Management Foundation Board. Travis has been active in the Kansas Pest Control Association, serving as president in 2014, when his main initiative was to improve technician education. He served as Education Committee chair for seven years and helped establish a Master Technician Program partnership with Kansas State University.

Outside of wrangling pests, he and his wife, Jenny, have three children and enjoy traveling. He and his oldest son, Connor, are Scuba Certified and take the opportunity to dive whenever the opportunity arises.

Student Awards: Tuesday, November 19 • 6:30 PM

John Henry Comstock Award, Larry Larson Award, Lillian and Alex Feir Travel Award, ESA Award, Student Certification Award



John Henry Comstock Graduate Student Awards

These six awards are given to one graduate student from each ESA Branch to promote interest in entomology and to stimulate interest in attending the ESA Annual Meeting.



Dr. Ethan Degner
(Eastern Branch) received his Ph.D. in entomology from Cornell University under the direction of Dr. Laura Harrington.

Ethan received his bachelor's degree from Gustavus Adolphus College in Saint Peter, Minnesota, where he focused on fisheries biology and natural resources. However, an internship at the Smithsonian Tropical Research Institute in Gamboa, Panamá, found him working with leaf-cutter ants and quickly ignited his passion for entomology. Wanting to study insects that transmit human diseases, he joined the Harrington Lab at Cornell, where he studied several poorly understood aspects of mosquito reproduction. His work clarified several persistent notions about *Aedes aegypti* reproductive biology, including the notion that females are always monogamous (they sometimes mate more than once, and usually shortly after their first mating); that males produce very few sperm as adults (they may produce many, given sufficient larval nutrition); and that sperm are static cells that simply act as a vessel for paternal DNA (*Aedes aegypti* sperm shed an entire coat and membrane after they are stored and prior to fertilization). During his time at Cornell, he discovered a passion for teaching and undergraduate mentorship. Through these efforts, he won a college-wide Outstanding TA Award and helped one of his mentees publish his senior thesis in the *Journal of Medical Entomology*. Together, his dissertation research and graduate teaching experiences prepared him well for his new position as assistant professor at Wisconsin Lutheran College, where he currently serves.



Seunghyun Lee
(International Branch) has been deeply obsessed with the remarkable biological diversity of life and morphology of

longhorned beetles since childhood. In 2014, he started his academic career as a Ph.D. student in the Insect Biosystematics Laboratory at Seoul National University, under the supervision of Professor Seunghwan Lee.

His Ph.D. research focuses on understanding the longhorned beetle under systematic, phylogenetic, and evolutionary aspects. More specifically, his research on the Cerambycine beetle in South Korea has discovered several numbers of new distributional records, as well as a handful number of species that are new to science. In addition, he described complete life history (including host species, host condition, feeding habit, and pupal chamber) and immature morphology of numerous South Korean Cerambycinae. His last dissertation chapter elucidates the evolutionary history of host plant use, the evolution of ovipositors, the effect of biological traits on ovipositor morphology, and the related organs using multigene phylogeny.

He published an illustrated guidebook of Korean Cerambycidae that covers all 357 species of longhorned beetle in the Korean peninsula, in addition to 10 peer-reviewed articles. He has also received numerous awards from or related to the academic field, public speeches, and a wildlife photo contest. Lee received the Talent Award of Korea (Deputy Prime Minister and Minister of Education of Korea Award) for his outstanding entomological research and popularization of science in 2016.



Ryan Schmid
(North Central Branch) grew up on a small farm in northwest Iowa and credits his upbringing for generating a passion

to work closely with farmers. His interest in entomology and its importance to agriculture began while he was working as an undergraduate biological science aid in an entomology research lab for Dr. Jonathan Lundgren. Upon completion of his B.S. degrees in biology and microbiology in 2011 from South Dakota State University (SDSU), Ryan pursued graduate programs that merged his newfound appreciation of entomology with a desire to help farmers and stakeholders. Consequently, Ryan earned an M.S. degree from SDSU in 2014 working with Dr. Lundgren on biological control of weed seeds in farming systems, and a Ph.D. in entomology from Kansas State University in 2018 under the direction of Dr. Brian McCornack, studying novel insect-monitoring techniques. Ryan's graduate school experiences have honed his research interests to focus on insect ecology and pest management and in applying those interests to help farmers and ranchers innovate their conventional farming systems to produce food, fuel, and fiber with minimal adverse impacts on the land. Currently, he is a research scientist with the Ecdysis Foundation, working closely with ranchers to investigate ecosystem services provided by arthropod communities in their regenerative rangeland management programs.

Student Awards: Tuesday, November 19 • 6:30 PM

John Henry Comstock Award, Larry Larson Award, Lillian and Alex Feir Travel Award, ESA Award, Student Certification Award

ESA Student Awards—continued



John Henry Comstock Graduate Student Awards—continued

These six awards are given to one graduate student from each ESA Branch to promote interest in entomology and to stimulate interest in attending the ESA Annual Meeting.



Brendon E. Boudinot
(Pacific Branch) is a doctoral candidate in the Department of Entomology and Nematology at the University of California,

Davis, where he is advised by Dr. Phil Ward. He received his bachelor of science degree in entomology at the Evergreen State College in Olympia, Washington, where he worked as a Fellow of the natural history collections and as a technician sorting ants for Dr. Jack Longino's biodiversity surveys of Mesoamerica. Brendon is broadly interested in the origin and evolution of complex phenotypic systems, and he specializes in ant taxonomy and morphological evolution within the Aculeata and across the Arthropoda. At Davis, Brendon has combined comparative morphology, molecular phylogenetics, and paleontology to provide the first male-based keys to the ant subfamilies of the world, a general theory for the male and female genitalic homologies of the Hexapoda, and the first total-evidence dating analyses of the Formicidae. As a student member of ESA, Brendon organized a symposium on evolutionary and phylogenetic morphology, has been awarded the President's Prize in the Systematics and Evolutionary Biology Section three times, and has been a championship member of three Linnaean Games teams. Brendon has also dedicated his time to his department, serving as president of the Entomology Graduate Student Association for three years and as co-chair for several committees, and has twice led an introductory entomology course taught entirely by graduate students. His postdoctoral research aims are to use computational anatomy to model mechanical evolution of aculeate legs and to develop a three-dimensional digital atlas of morphology.



Dr. Lina Bernaola
(Southeastern Branch) was born in Lima, Peru. She received her Ph.D. in entomology from Louisiana State University (LSU) under

the direction of Dr. Michael Stout. Lina earned her B.S. in biological sciences from San Marcos National University, Peru, and later completed her M.S. in agronomy at LSU. Her research interests include plant-insect and plant-pathogen interactions as well as host plant resistance. Her project involves investigations of the mechanistic basis of plant resistance against above-ground and below-ground organisms in rice. Primarily, she studied the effects of mycorrhizal fungi, a symbiotic soil-borne organism, on rice resistance to insect herbivores and pathogens. The ultimate goal of Lina's research is to provide a better understanding of plant-insect-mycorrhizae interactions in rice pests of Louisiana, which will help to develop more effective pest management programs in rice.

Lina has been actively involved in the Entomological Society of America since 2013. She has presented her research at several international, national, and Southeastern Branch meetings; she has also participated in LSU's Linnaean Games and Student Debate teams. Currently, she serves as student representative to the Governing Board and vice chair to the Student Affairs Committee. She has served on the P-IE Governing Council as the student representative and as president of LSU's Entomology Club, coordinating many of the club's educational outreach events about insects to kids. She is very grateful to the society for the many opportunities it has provided her. She has had a lifelong interest in science and looks forward to sharing this passion with younger generations.



Jocelyn R. Holt's
(Southwestern Branch) research is increasing our understanding of the interplay between genetics and insect mutualisms in invasive

species. She is assessing the role insect microbiomes play in mediating mutualisms among insects. Her research has revealed microbial differences between sugarcane aphids (SCA) that seem to correspond to genetic differences of sorghum or sugarcane populations. She is also investigating whether these genetically distinct SCA populations differ in their attractiveness to ants and is examining the fine-scale genetic structure of the tawny crazy ant to inform future integrated pest management. Jocelyn was born in California, where she completed a B.S. in biology at Cal Poly Pomona and an M.S. in biology at CSUN. She received a graduate Diversity Excellence Fellowship and a Lechner Excellence Fellowship to attend Texas A&M, where she is currently a Ph.D. candidate. She is committed to increasing diversity in academia and to facilitating the retention of women in STEM fields, seen by her participation in the ESA Student Affairs Committee, Aggie Women in Entomology, LAUNCH Program, and TAMU WISE. She fosters the next generation of scientists through teaching and mentorship of undergraduate researchers. Jocelyn's research and service exemplify her passion for entomology and science advocacy.

Student Awards: Tuesday, November 19 • 6:30 PM

John Henry Comstock Award, Larry Larson Award, Lillian and Alex Feir Travel Award, ESA Award, Student Certification Award



Larry Larson Graduate Student Award for Leadership in Applied Entomology

This ESA award, sponsored by Corteva, recognizes Dr. Larry Larson's role as a leader and pioneer in insect management and carries that legacy to the next generation of leaders in applied entomology.



Amy Geffre is a social insect biologist and pollinator health researcher. Of special interest to her are adaptations that social insects, like honey bees, have evolved to deal with pathogen threat in the context of social living. Additionally, she is interested in the interface at which honey bees interact with other pollinators, and how diseases are transmitted between species at shared resources. Her previous work includes exploring how pathogens and parasites modify the behavior of social insect hosts, including how viral pathogens alter social behavior of honey bees and the potential ramifications of this on modern apiculture. Her current projects focus on how modern apiculture can benefit from better understanding of the biology and ecology of feral honey bees. Through her research, she hopes to improve beekeeping practices to better ensure the health of insect pollinators in general.

Geffre has enjoyed many opportunities to work with wonderful colleagues and citizen scientists of all ages. She has been a visiting entomologist at schools from kindergarten to high school, and she has created and presented outreach events including pollinator exploration and habitat improvement activities. She has also been privileged to work with the Young Engineers and Scientists and SYMBI K-12 programs, in which she strove to give high school students hands-on science experience and encourage them to pursue science-related goals throughout their lives. Additionally, she is a scientific illustrator and uses these skills to create educational material and displays for the public as well as for scientific works.



Lillian and Alex Feir Graduate Student Travel Award in Insect Physiology, Biochemistry, or Molecular Biology

The purpose of this ESA award is to encourage graduate students working with insects or other arthropods in the broad areas of physiology, biochemistry, and molecular biology to affiliate with ESA's Integrative Physiological and Molecular Insect Systems Section and to attend the ESA Annual Meeting.



Yan Yan became fascinated with insect physiology while working as a visiting scholar at Purdue University in the laboratory of Dr. Dieudonné Baributsa and Dr. Larry Murdock. There, she investigated how the low-oxygen environment in sealed grain containers could be harnessed to kill storage insect pests.

Since finishing her research at Purdue, Yan has been pursuing a doctoral degree at Vanderbilt University in the laboratory of Dr. Julián Hillyer. At Vanderbilt, she employs organismal, molecular, and imaging approaches to decipher the physiological interaction between the immune and circulatory systems of insects, focusing on mosquitoes. Specifically, Yan investigates how the immune cells of mosquitoes respond to pathogenic infections and how the aggregation of immune cells in specific regions of the heart helps mosquitoes to overcome infections.

Yan has published eight peer-reviewed papers, four of them as the first author. She received first place in the Student Paper Competition at the 2018 joint annual meeting of ESA, ESC, and ESBC. Yan is also the recipient of a Vanderbilt University dissertation enhancement grant, which is enabling her to use biochemical tools to further understand mosquito physiology.

Student Awards: Tuesday, November 19 • 6:30 PM

John Henry Comstock Award, Larry Larson Award, Lillian and Alex Feir Travel Award, ESA Award, Student Certification Award



ESA Student Activity Award

Sponsored by Bayer, this award will be presented annually to recognize a student for outstanding contributions to the Society, his/her academic department, and the community, while still achieving academic excellence.



Casey Parker, a Ph.D. candidate at the University of Florida, discovered her love for biology on the horse farm she grew up on in Ocala, Florida. Her fascination with the natural world led her to pursue a B.Sc. in entomology and nematology. During her time as an undergraduate, she took an interest in vector biology and control of public health pests. After her B.Sc., she completed an M.Sc. in entomology and nematology and master of public health degree. Her current research focuses on insecticide resistance, the impact of resistance on vector competence, and developing community education campaigns to combat mosquitoes. Casey's work has been published in several journals, including *Journal of Medical Entomology*, *Journal of Insect Science*, and *Journal of Vector Ecology*.

Casey also enjoys engaging in science communication opportunities and getting involved in professional organizations. Casey has given numerous presentations at regional, national, and international conferences and has received speaking awards at several of these meetings. She also actively participates in leadership and outreach activities such as hosting educational programs in local schools and delivering international vector control training programs. In Casey's time as an ESA member, she has served as the chair of both the Southeastern Branch and National Student Affairs Committee, a role that allowed her to assist in planning annual meetings, symposia, and student events. Casey would like to thank ESA for providing her with these opportunities, and she looks forward to spending a career continuing to support the entomological and vector control community.



Student Certification Award

This award recognizes and encourages outstanding entomology graduate students with interest in the mission of the ESA certification program.



Ashley Kennedy is originally from Lorton, Virginia. She studied vernal monkeys for her undergraduate thesis research at Johns Hopkins University and completed internships and seasonal positions at the Smithsonian Environmental Research Center (Maryland), the National Zoo (D.C.), and the

Smithsonian Conservation Biology Institute (Virginia). In 2013, she completed her M.S. in the Department of Entomology and Wildlife Ecology at the University of Delaware, where she studied delphacid planthopper taxonomy in the lab of Charles Bartlett, Ph.D. In summer 2019, Ashley received her Ph.D. in the lab of Doug Tallamy, Ph.D., at the University of Delaware. Her dissertation research focused on bird-insect food webs, using photography to learn which insects are most important in bird diets. She is also a Class of 2017 Science Policy Fellow, a 2018 recipient of the John Henry Comstock Graduate Student Award, and a member of the Delaware Native Species Commission. She is excited to compete in the Linnaean Games for the fifth and final time this year.

Ashley is currently an ORISE Postdoctoral Fellow in the Tick-Borne Disease Laboratory at the Army Public Health Center in Maryland. Outside of entomology, Ashley enjoys classic literature and volunteering with her therapy dog at prisons and libraries.

**You
Tube Your
Entomology
Stinger Awards**

ESA thanks all entrants to the contest as well as the judging committee members: Marlin Rice (chair), Jeff Bradshaw, Laura Higgins, Erin Hodgson, Clinton Pilcher, and Carol Pilcher.

The Stinger Awards honor the winners of ESA's annual "You Tube Your Entomology" video contest, in which ESA members showcase their talents and creativity through video. The winner, runner up, and two honorable mentions will be announced during the Awards Breakfast on Tuesday November 19, from among the following finalists:

"Alien Thistles: The 8th Passenger"

By Daniela P. Ortiz, Marina A. Alma, and Andrés M. Devegili, with Gabriela I. Pirk and María N. Lescano, Laboratorio de Investigación en Hormigas

"Fungal Control of the Asian Longhorned Beetle"

By Max Helmberger, Michigan State University; and Eric Clifton, Cornell University

"Ants and Blues: The Feeling is Mutual"

By Geena Hill, Chris Johns, Simon McClung, and Jaret Daniels, University of Florida

"Why Support Insect Museums?"

By Dan Rubinoff, Godwin Polendey, and Mark Berthold, University of Hawaii



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American Entomologist

Annals of the ESA

Arthropod Management Tests

Environmental Entomology

Insect Systematics and Diversity

Journal of Economic Entomology

Journal of Integrated Pest Management

Journal of Insect Science

Journal of Medical Entomology

BOOTH
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Visit Booth #323 to discover ESA's spectrum of entomology journals, or visit insectscience.org to learn more.

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Daily Schedule by Date & Time

FRIDAY, NOVEMBER 15

TIME	SESSION/FUNCTION	LOCATION
12:00 PM - 9:00 PM	CAMTech IAB Meeting	Laurel Ballroom, Embassy Suites

SATURDAY, NOVEMBER 16

TIME	SESSION/FUNCTION	LOCATION
7:00 AM - 4:00 PM	ESA Governing Board and Certification Corporation Meeting	Hawthorne/Lucas/Flora, Marriott Grand
7:30 AM - 5:00 PM	Annual Review of Entomology	Laclede Boardroom, Marriott Grand
7:30 AM - 5:00 PM	CAMTech IAB Meeting - Day 2	Laurel Ballroom, Embassy Suites
7:30 AM - 5:30 PM	S1070: The Working Group on Improving Microbial Control of Arthropod Pests	Landmark Ballroom 5, Marriott Grand
8:00 AM - 6:00 PM	Entomological Collections Network Meeting	Landmark Ballroom 1/2/3, Marriott Grand
10:00 AM - 4:00 PM	Registration and Information Center	Washington Lobby, America's Center
2:00 PM - 2:30 PM	Moderator Training	Room 240, America's Center
3:00 PM - 5:00 PM	Council for Entomology Department Administrators Annual Meeting	Landmark Ballroom 6, Marriott Grand
3:00 PM - 6:00 PM	Presentation Preview Room (PPR)/Speaker Ready Room	Room 106, America's Center
6:00 PM - 6:30 PM	Student Volunteer Training	Room 200, America's Center
6:00 PM - 9:00 PM	Entomological Collections Network Banquet	Landmark Ballroom 4, Marriott Grand

SUNDAY, NOVEMBER 17

TIME	SESSION/FUNCTION	LOCATION
7:00 AM - 8:30 AM	Tour: 5K Fun Run/Running Tour of St. Louis	Washington Lobby, America's Center
7:00 AM - 12:00 PM	Entomological Collections Network Meeting Day 2	Landmark Ballroom 1/2/3, Marriott Grand
7:00 AM - 7:30 AM	Moderator Training	Room 240, America's Center
7:00 AM - 6:00 PM	Presentation Preview Room (PPR)/Speaker Ready Room	Room 106, America's Center
7:00 AM - 9:00 PM	Registration and Information Center	Washington Lobby, America's Center
8:00 AM - 11:45 AM	Program Symposium: Marketing Entomology in the 21st Century: Delivering Knowledge, Changing Attitudes, and Encouraging Action	Room 240, America's Center
8:00 AM - 12:00 PM	Program Workshop: From Instars to Adults: Implementing Outreach Activities across Different Education Levels and Audiences	Room 261, America's Center
8:00 AM - 11:15 AM	MUVE Section Symposium: Can We Really Eliminate Mosquito-Borne Disease in 21st Century?	Room 120, America's Center
8:00 AM - 11:40 AM	PBT Section Symposium: Insecticidal RNAi: From Targets to Field Applications	Room 274, America's Center
8:00 AM - 11:00 AM	PBT Section Symposium: Novel Applications and Risk Management of Genetic Technologies for Pest Management	Room 275, America's Center
8:00 AM - 12:00 PM	PBT Section Symposium: Odorant Reception and Perception in Mosquitoes and Flies	Room 267, America's Center
8:00 AM - 10:00 AM	P-IE Section Symposium: Advocating for Forest Entomology through Teaching and Extension	Room 230, America's Center
8:00 AM - 10:30 AM	Member Symposium: Advocate Entomology without the Jargon	Room 127, America's Center
8:00 AM - 11:10 AM	Member Symposium: Advocate for All Entomologists! Insect Scientist Stories from Beyond Academia	Room 260, America's Center
8:00 AM - 11:30 AM	Member Symposium: Advocate Sharing: The Science of Unpublished Results in Entomology	Room 123, America's Center

Daily Schedule by Date & Time

SUNDAY, NOVEMBER 17

TIME	SESSION/FUNCTION	LOCATION
8:00 AM - 11:45 AM	Member Symposium: Caterpillars in a Tritrophic World: Adaptations and Counteradaptations	Room 231, America's Center
8:00 AM - 12:00 PM	Member Symposium: Preparing to Sequence the Planet - Starting with our Insect Friends	Room 241, America's Center
8:00 AM - 11:35 AM	Member Symposium: Unabashed Advocacy of Arthropods: Living Tribute to Justin O. Schmidt	Room 125, America's Center
8:00 AM - 12:00 PM	Organized Meeting: Current Advances in Acarology	Room 126, America's Center
8:00 AM - 12:00 PM	10-min: PBT, Insecticides and Resistance	Room 266, America's Center
8:00 AM - 11:40 AM	10-min: P-IE, Biocontrol, Parasitoids, and Pathogens	Room 232, America's Center
8:00 AM - 9:50 AM	10-min: P-IE, Chemical Ecology	Room 264, America's Center
8:00 AM - 10:30 AM	10-min: P-IE, Ecology and Climate Change	Room 265, America's Center
8:00 AM - 11:20 AM	10-min: P-IE, IPM, Horticulture 2	Room 263, America's Center
8:00 AM - 11:30 AM	10-min: P-IE, Pollination	Room 242, America's Center
8:00 AM - 9:00 AM	Entomology 2019 Program Committee Meeting	Room 131, America's Center
8:00 AM - 10:00 AM	Journal of Medical Entomology Editorial Board Meeting	Aubert/Parkview, Marriott Grand
9:00 AM - 10:00 AM	Grand Challenge in Entomology (GCAFE) Leadership Meeting	Benton, Marriott Grand
10:00 AM - 12:00 PM	Member Symposium: Arthropod-Vertebrate Molecular Interactions and Pathogen Emergence	Room 121, America's Center
10:00 AM - 11:15 AM	3-min: All Sections	Room 124, America's Center
10:00 AM - 11:10 AM	10-min: MUVE, Vector Surveillance	Room 122, America's Center
10:00 AM - 12:00 PM	Annals of the ESA Editorial Board Meeting	Aubert/Parkview, Marriott Grand
12:00 PM - 12:30 PM	Student Competition Judges Training	Room 230, America's Center
12:00 PM - 4:00 PM	Tour: Gateway to St. Louis Intro	Washington Lobby, America's Center
12:05 PM - 2:00 PM	Bedoukian-Sponsored Discussion: Odorant Reception and Perception in Mosquitoes and Flies	Room 267, America's Center
12:15 PM - 1:15 PM	Lunch & Learn: Selling Yourself and Building Your Brand as an Early Career Professional	Room 130, America's Center
12:15 PM - 1:15 PM	Lunch & Learn: The Journal of Entomological Education and Outreach	Room 131, America's Center
12:30 PM - 1:00 PM	Student Volunteer Training	Room 200, America's Center
1:00 PM - 3:00 PM	Environmental Entomology Editorial Board Meeting	Aubert/Parkview, Marriott Grand
1:00 PM - 3:00 PM	Linnaean Games - Preliminary Rounds	America's Ballroom, America's Center
1:00 PM - 4:00 PM	NCSRP Research Planning Meeting	Benton, Marriott Grand
1:30 PM - 5:30 PM	Program Symposium: Advocating Diversity Among Entomologists: If Insects Are Diverse, We Should Be, Too!	Room 240, America's Center
1:30 PM - 5:30 PM	Workshop: Classical Biological Control of Weeds: Petition Development, Improvement, Submission, and Review	Room 261, America's Center
1:30 PM - 4:50 PM	MUVE Section Symposium: Advocate Research and Development of Insect Repellents	Room 120, America's Center
1:30 PM - 5:30 PM	PBT Section Symposium: Insecticidal RNAi: New Invertebrate Targets, Mode of Action, and Resistance	Room 274, America's Center
1:30 PM - 5:30 PM	PBT Section Symposium: INSEcticide TArgets and Resistance (INSTAR) Summit	Room 266, America's Center
1:30 PM - 4:15 PM	P-IE Section Symposium: "Callow's" and "Pre-Imaginal" Professionals of Pollination Research	Room 262, America's Center
1:30 PM - 5:10 PM	P-IE Section Symposium: Advocacy in Action: Tackling Invasive Species through Collaboration, Policy, and Public Engagement	Room 241, America's Center
1:30 PM - 5:30 PM	SysEB Section Symposium: The Road to Sociality: Integrated Concepts of Social Behavior in Insects	Room 132, America's Center
1:30 PM - 4:30 PM	SysEB Section Symposium: What Everyone Ought to Know about Insect Biodiversity in the Urban Environment	Room 123, America's Center

Daily Schedule by Date & Time

SUNDAY, NOVEMBER 17

TIME	SESSION/FUNCTION	LOCATION
1:30 PM - 4:30 PM	Member Symposium: Defying the Decline: Applied and Research-Based Conservation Initiatives Making a Difference in Sustaining Insect Biodiversity	Room 263, America's Center
1:30 PM - 4:00 PM	Member Symposium: Forensic Entomology	Room 121, America's Center
1:30 PM - 5:10 PM	Member Symposium: Latest Advancements and Challenges in Insect Rearing and Testing	Room 275, America's Center
1:30 PM - 3:30 PM	Member Symposium: Linking Insect Movement Ecology with Applied Pest Management	Room 231, America's Center
1:30 PM - 5:30 PM	Member Symposium: Mite Evolution	Room 126, America's Center
1:30 PM - 5:30 PM	Member Symposium: New Discoveries and Practical Approaches to Greenhouse Insect Management	Room 242, America's Center
1:30 PM - 5:10 PM	Member Symposium: Semiochemicals of Wood-Boring Beetles	Room 230, America's Center
1:30 PM - 5:20 PM	Member Symposium: Space, Time, and Disease: Vectors Across Multiple Spatial and Temporal Scales	Room 276, America's Center
1:30 PM - 4:00 PM	Member Symposium: <i>Spodoptera frugiperda</i> in Africa and Asia: Potential for Novel IPM	Room 260, America's Center
1:30 PM - 5:10 PM	Member Symposium: The Show-Me State: Current Entomological Research and Conservation in Missouri	Room 122, America's Center
1:30 PM - 5:30 PM	Organized Meeting: International Society of Hymenopterists Symposium and Business Meeting	Room 130, America's Center
1:30 PM - 4:30 PM	Organized Meeting: Small Orders, Big Ideas	Room 125, America's Center
1:30 PM - 5:30 PM	Organized Meeting: SOLA Scarab Workers	Room 127, America's Center
1:30 PM - 5:20 PM	10-min: PBT, Physiology	Room 280, America's Center
1:30 PM - 3:10 PM	10-min: P-IE, Behavior and Apiculture	Room 265, America's Center
1:30 PM - 5:20 PM	10-min: P-IE, Biocontrol, General and Predators	Room 232, America's Center
1:30 PM - 2:50 PM	10-min: P-IE, IPM, Field Crops 2	Room 264, America's Center
1:30 PM - 3:20 PM	10-min: SysEB, Diversity, Evolution, and Biology of Hemiptera	Room 124, America's Center
2:00 PM - 5:00 PM	Certification Board Meeting	Hawthorne/Lucas/Flora, Marriott Grand
3:00 PM - 5:00 PM	American Entomologist Editorial Board Meeting	Aubert/Parkview, Marriott Grand
4:00 PM - 5:00 PM	10-min: P-IE, Stored Product Pests	Room 231, America's Center
4:45 PM - 5:30 PM	Annual Business Meeting of the Acarological Society of America	Room 126, America's Center
5:30 PM - 7:30 PM	Opening Plenary Session with Keynote by Erica McAlister	America's Ballroom, America's Center
7:30 PM - 9:30 PM	Exhibit Hall	Exhibit Hall 1 & 2, America's Center
7:30 PM - 9:30 PM	Welcome Reception	Exhibit Hall 1 & 2, America's Center

MONDAY, NOVEMBER 18

TIME	SESSION/FUNCTION	LOCATION
6:30 AM - 7:50 AM	Women and Allies in Entomology Breakfast	America's Ballroom, America's Center
7:00 AM - 2:00 PM	Judges Break Room	Room 200, America's Center
7:00 AM - 7:30 AM	Moderator Training	Room 240, America's Center
7:00 AM - 6:00 PM	Presentation Preview Room (PPR)/Speaker Ready Room	Room 106, America's Center
7:00 AM - 5:00 PM	Registration and Information Center	Washington Lobby, America's Center
7:00 AM - 7:30 AM	Student Competition Judges Training	Room 230, America's Center
7:00 AM - 12:00 PM	The Coleopterists Society Executive Council Meeting	Portland, Marriott Grand
7:30 AM - 1:00 PM	IRAC-US Meeting	Hawthorne/Lucas/Flora, Marriott Grand

Daily Schedule by Date & Time

MONDAY, NOVEMBER 18

TIME	SESSION/FUNCTION	LOCATION
8:00 AM - 9:50 AM	Program Workshop: Start Advocating Entomology on Social Media!	Room 261, America's Center
8:00 AM - 11:00 AM	Workshop: Work on Your Social Life: Starting Social Science Collaborations	Room 225/226, America's Center
8:00 AM - 9:10 AM	Student 3-min: All Sections 1	Room 132, America's Center
8:00 AM - 9:30 AM	Grad 10-min: MUVE, Disease Transmission	Room 120, America's Center
8:00 AM - 9:30 AM	Grad 10-min: MUVE, Ecology and Behavior 1	Room 121, America's Center
8:00 AM - 9:40 AM	Grad 10-min: MUVE, Insecticide Efficacy and Resistance 1	Room 122, America's Center
8:00 AM - 10:00 AM	Grad 10-min: MUVE, Life History	Room 123, America's Center
8:00 AM - 10:00 AM	Grad 10-min: PBT, Biology	Room 275, America's Center
8:00 AM - 9:40 AM	Grad 10-min: PBT, Molecular and Cellular Biology 1	Room 266, America's Center
8:00 AM - 9:40 AM	Grad 10-min: PBT, Molecular and Cellular Biology 3	Room 267, America's Center
8:00 AM - 9:30 AM	Grad 10-min: PBT, Toxicity 1	Room 274, America's Center
8:00 AM - 10:00 AM	Grad 10-min: P-IE, Biocontrol of Insects 1	Room 264, America's Center
8:00 AM - 10:00 AM	Grad 10-min: P-IE, Biocontrol of Insects 2	Room 265, America's Center
8:00 AM - 10:00 AM	Grad 10-min: P-IE, Chemical Ecology	Room 241, America's Center
8:00 AM - 9:20 AM	Grad 10-min: P-IE, Climate Change	Room 240, America's Center
8:00 AM - 10:00 AM	Grad 10-min: P-IE, Ecology 1	Room 262, America's Center
8:00 AM - 10:00 AM	Grad 10-min: P-IE, Ecology 2	Room 263, America's Center
8:00 AM - 10:00 AM	Grad 10-min: P-IE, Invasive Species	Room 280, America's Center
8:00 AM - 9:50 AM	Grad 10-min: P-IE, IPM Field Crops 1	Room 230, America's Center
8:00 AM - 9:40 AM	Grad 10-min: P-IE, IPM Field Crops 3	Room 231, America's Center
8:00 AM - 9:40 AM	Grad 10-min: P-IE, IPM Field Crops 5	Room 232, America's Center
8:00 AM - 9:40 AM	Grad 10-min: P-IE, Pollination 1	Room 223, America's Center
8:00 AM - 9:30 AM	Grad 10-min: P-IE, Pollination 2	Room 224, America's Center
8:00 AM - 9:30 AM	Grad 10-min: P-IE, Resistance Management	Room 242, America's Center
8:00 AM - 9:30 AM	Grad 10-min: P-IE, Vectors 1	Room 260, America's Center
8:00 AM - 9:50 AM	Grad 10-min: SysEB, Behavior	Room 125, America's Center
8:00 AM - 9:40 AM	Grad 10-min: SysEB, Biogeography and Disturbance	Room 127, America's Center
8:00 AM - 9:20 AM	Grad 10-min: SysEB, Evolution 1	Room 130, America's Center
8:00 AM - 9:30 AM	Grad 10-min: SysEB, Morphology and Phylogeny	Room 124, America's Center
8:00 AM - 10:00 AM	Grad 10-min: SysEB, Phylogenetics 2	Room 131, America's Center
8:00 AM - 9:20 AM	Undergrad 10-min: PBT and MUVE 1	Room 276, America's Center
8:00 AM - 9:40 AM	Undergrad 10-min: SysEB 1	Room 126, America's Center
8:00 AM - 10:00 AM	Journal of Integrated Pest Management Editorial Board Meeting	Aubert/Parkview, Marriott Grand
8:30 AM - 9:30 AM	Vector Borne Disease Stakeholder Group	Benton, Marriott Grand
9:00 AM - 11:00 AM	Antlion Pit Demonstration Day	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Infographic: MUVE and PBT	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Infographic: P-IE 1	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Infographic: P-IE 2	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Infographic: SysEB	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Poster: MUVE 1	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Poster: MUVE 2	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Poster: MUVE 3	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Poster: PBT 1	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Poster: PBT 2	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Poster: PBT 3	Exhibit Hall 1 & 2, America's Center

Daily Schedule by Date & Time

MONDAY, NOVEMBER 18

TIME	SESSION/FUNCTION	LOCATION
9:00 AM - 6:30 PM	Grad Poster: PBT 4	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Poster: P-IE, Biological Control	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Poster: P-IE, Ecology 1	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Poster: P-IE, Ecology 2	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Poster: P-IE, IPM 1	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Poster: P-IE, IPM 2	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Poster: P-IE, IPM 3	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Poster: P-IE, Plant Disease Vectors	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Poster: P-IE, Pollinator	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Poster: SysEB 1	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Poster: SysEB 2	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Poster: SysEB 3	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Undergrad Poster: MUVE 1	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Undergrad Poster: MUVE 2	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Undergrad Poster: PBT 1	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Undergrad Poster: PBT 2	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Undergrad Poster: P-IE 1	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Undergrad Poster: P-IE 2	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Undergrad Poster: P-IE 3	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Undergrad Poster: SysEB 1	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Undergrad Poster: SysEB 2	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Undergrad Poster: SysEB 3	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Student Virtual Infographic: All Sections	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Virtual Poster: MUVE, PBT, and SysEB	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Grad Virtual Poster: P-IE	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Undergrad Virtual Poster: MUVE, PBT, and SysEB	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Undergrad Virtual Poster: P-IE	Exhibit Hall 1 & 2, America's Center
9:00 AM - 5:00 PM	Exhibit Hall	Exhibit Hall 1 & 2, America's Center
9:30 AM - 10:40 AM	Student 3-min: All Sections 2	Room 132, America's Center
10:00 AM - 11:50 AM	Program Workshop: Start Advocating Entomology on Social Media!	Room 261, America's Center
10:00 AM - 12:00 PM	ESA Science Policy Committee	Benton, Marriott Grand
10:00 AM - 12:00 PM	Journal of Economic Entomology Editorial Board Meeting	Aubert/Parkview, Marriott Grand
10:10 AM - 11:40 AM	Grad 10-min: MUVE, Diversity	Room 120, America's Center
10:10 AM - 11:40 AM	Grad 10-min: MUVE, Ecology and Behavior 2	Room 121, America's Center
10:10 AM - 11:50 AM	Grad 10-min: MUVE, Insecticide Efficacy and Resistance 2	Room 122, America's Center
10:10 AM - 12:00 PM	Grad 10-min: MUVE, Molecular and Cellular Biology	Room 123, America's Center
10:10 AM - 11:40 AM	Grad 10-min: PBT, Insecticide Resistance	Room 275, America's Center
10:10 AM - 11:50 AM	Grad 10-min: PBT, Molecular and Cellular Biology 2	Room 266, America's Center
10:10 AM - 11:20 AM	Grad 10-min: PBT, Pollinator Biology and Ecology	Room 267, America's Center
10:10 AM - 11:40 AM	Grad 10-min: PBT, Toxicity 2	Room 274, America's Center
10:10 AM - 11:40 AM	Grad 10-min: P-IE, Apiculture	Room 223, America's Center
10:10 AM - 12:00 PM	Grad 10-min: P-IE, Behavior	Room 263, America's Center
10:10 AM - 12:10 PM	Grad 10-min: P-IE, Biocontrol of Insects 3	Room 264, America's Center
10:10 AM - 11:30 AM	Grad 10-min: P-IE, Biocontrol of Plants	Room 265, America's Center
10:10 AM - 12:00 PM	Grad 10-min: P-IE, Ecology 3	Room 262, America's Center

Daily Schedule by Date & Time

MONDAY, NOVEMBER 18

TIME	SESSION/FUNCTION	LOCATION
10:10 AM - 12:00 PM	Grad 10-min: P-IE, Forests	Room 280, America's Center
10:10 AM - 12:10 PM	Grad 10-min: P-IE, Host Plant Resistance	Room 242, America's Center
10:10 AM - 12:10 PM	Grad 10-min: P-IE, IPM Field Crops 2	Room 230, America's Center
10:10 AM - 12:00 PM	Grad 10-min: P-IE, IPM Field Crops 4	Room 231, America's Center
10:10 AM - 12:00 PM	Grad 10-min: P-IE, IPM Horticulture	Room 232, America's Center
10:10 AM - 11:40 AM	Grad 10-min: P-IE, Molecular and Cell Biology / Novel Tools	Room 241, America's Center
10:10 AM - 12:00 PM	Grad 10-min: P-IE, Pollination 3	Room 224, America's Center
10:10 AM - 11:30 AM	Grad 10-min: P-IE, Vectors 2	Room 260, America's Center
10:10 AM - 12:00 PM	Grad 10-min: SysEB, Evolution 2	Room 130, America's Center
10:10 AM - 11:40 AM	Grad 10-min: SysEB, Phylogenetics 1	Room 124, America's Center
10:10 AM - 11:40 AM	Grad 10-min: SysEB, Phylogenetics 3	Room 131, America's Center
10:10 AM - 11:30 AM	Grad 10-min: SysEB, Symbionts	Room 125, America's Center
10:10 AM - 11:50 AM	Grad 10-min: SysEB, Taxonomy and Diversity	Room 127, America's Center
10:10 AM - 11:50 AM	Undergrad 10-min: PBT and MUVE 2	Room 276, America's Center
10:10 AM - 12:00 PM	Undergrad 10-min: P-IE	Room 240, America's Center
10:10 AM - 12:00 PM	Undergrad 10-min: SysEB 2	Room 126, America's Center
12:00 PM - 2:00 PM	Archives of Insect Biochemistry and Physiology Editorial Board Meeting	Laclede Boardroom, Marriott Grand
12:15 PM - 1:15 PM	Lunch & Learn: Funding Opportunities at the National Science Foundation	Room 131, America's Center
12:15 PM - 1:15 PM	Lunch & Learn: Navigating Cultural Diversity in Scientific Research, Education, and Leadership	Room 130, America's Center
12:30 PM - 3:15 PM	Tour: Bayer Research and Development Center	Washington Lobby, America's Center
1:00 PM - 3:00 PM	Antlion Pit Presentation Session	America's Ballroom, America's Center
1:00 PM - 4:30 PM	ESA Science Policy Fellow Workshop	Benton, Marriott Grand
1:00 PM - 2:00 PM	Thomas Say Editorial Board Meeting	Aubert/Parkview, Marriott Grand
1:30 PM - 4:00 PM	Tour: Donald Danforth Plant Science Center	Washington Lobby, America's Center
2:00 PM - 3:00 PM	ESA Committee on Common Names of Insects Meeting	Aubert/Parkview, Marriott Grand
2:30 PM - 5:30 PM	Organized Meeting: Highlights of Medical, Urban, and Veterinary Entomology & MUVE Business Meeting	Room 263/264, America's Center
2:30 PM - 5:30 PM	Organized Meeting: Physiology, Biochemistry, and Toxicology (PBT) Section Meeting Networking Session	Room 260, America's Center
2:30 PM - 5:30 PM	Organized Meeting: Plant-Insect Ecosystem (P-IE) Section Networking, Business, and Learning Session (All Welcome)	Room 230/231, America's Center
2:30 PM - 5:30 PM	Organized Meeting: Systematics, Evolution, and Biodiversity (SysEB) Section Business Meeting	Room 120/121/122, America's Center
3:00 PM - 5:00 PM	Journal of Insect Science Editorial Board Meeting	Aubert/Parkview, Marriott Grand
3:15 PM - 6:00 PM	Tour: Bayer Research and Development Center	Washington Lobby, America's Center
4:30 PM - 5:30 PM	ESA Science Policy Fellows Meet and Greet	Portland, Marriott Grand
5:00 PM - 6:00 PM	North Central Branch Student Affairs Committee Bi-Annual Meeting	Hawthorne/Lucas/Flora, Marriott Grand
5:30 PM - 6:30 PM	International Association of Black Entomologists (IABE) Annual Meeting	Room 223, America's Center
5:30 PM - 6:30 PM	Student Competition Poster and Infographic Social Hour	Exhibit Hall 1 & 2, America's Center
6:00 PM - 7:30 PM	Illinois Mixer	Landmark Ballroom 5/6, Marriott Grand
6:30 PM - 8:30 PM	Prairie States Mixer - Colorado, Iowa, Kansas, Nebraska	Crystal Ballroom, Marriott Grand
6:30 PM - 8:30 PM	Purdue Entomology Mixer	Majestic B, Marriott Grand
7:00 PM - 9:00 PM	2019 Mid-Atlantic Mixer	Majestic D, Marriott Grand

Daily Schedule by Date & Time

MONDAY, NOVEMBER 18

TIME	SESSION/FUNCTION	LOCATION
7:00 PM - 9:00 PM	Auburn, Arkansas, Clemson, Kentucky, and Tennessee Mixer	Washington Room, Marriott Grand
7:00 PM - 9:00 PM	Penn State University Mixer	Majestic F, Marriott Grand
7:00 PM - 9:00 PM	Texas A&M University, Oklahoma State University, and Southwestern Branch Mixer	Landmark Ballroom 4, Marriott Grand
7:00 PM - 9:00 PM	University of California Alumni and Friends Mixer	Landmark Ballroom 1/2, Marriott Grand
7:00 PM - 9:00 PM	University of Florida, University of Georgia, and NC State Joint Mixer	Majestic E, Marriott Grand
7:00 PM - 8:30 PM	University of Wisconsin Mixer	Majestic G, Marriott Grand
7:30 PM - 9:30 PM	PNW Mixer: Washington State University, University of Idaho, Oregon State University, & Montana State University	Statler Room, Marriott Grand
8:00 PM - 10:00 PM	Cornell University Entomology Mixer-Reception	Majestic A, Marriott Grand
8:00 PM - 10:00 PM	LGBTQIA+ Mixer	Benton, Marriott Grand
8:00 PM - 9:30 PM	Ohio State Mixer	Majestic C, Marriott Grand
8:00 PM - 10:00 PM	University of Minnesota Entomology Department Mixer	Landmark Ballroom 3, Marriott Grand

TUESDAY, NOVEMBER 19

TIME	SESSION/FUNCTION	LOCATION
7:00 AM - 7:30 AM	Moderator Training	Room 240, America's Center
7:00 AM - 6:00 PM	Presentation Preview Room (PPR)/Speaker Ready Room	Room 106, America's Center
7:00 AM - 5:00 PM	Registration and Information Center	Washington Lobby, America's Center
7:30 AM - 8:45 AM	ESA Professional Awards Breakfast Featuring the Founders' Memorial Lecture	America's Ballroom, America's Center
7:30 AM - 10:15 AM	Tour: Bayer Research and Development Center	Washington Lobby, America's Center
8:00 AM - 9:30 AM	Arthropod Management Tests Editorial Board Meeting	Aubert/Parkview, Marriott Grand
9:00 AM - 10:30 AM	Program Workshop: If They're Laughing, They're Listening	Room 261, America's Center
9:00 AM - 11:00 AM	MUVE Section Symposium: Promoting Warfighter Readiness: DoD-Funded Entomology Research and Product Development	Room 121, America's Center
9:00 AM - 12:00 PM	MUVE Section Symposium: Urban Pests and Vectors: Emerging Impacts, Sustainable Management, and Future Research	Room 120, America's Center
9:00 AM - 12:00 PM	PBT Section Symposium: Recent Trends in Pollinator Research - Understanding and Mitigating Current Stressors	Room 266, America's Center
9:00 AM - 12:00 PM	P-IE Section Symposium: Advocating for Entomology from the Air: Innovative Applications of Drone Technology in Entomological Research and Pest Management	Room 242, America's Center
9:00 AM - 12:00 PM	P-IE Section Symposium: An Advocate for Biological Control: Honoring the Career of Dick Reardon	Room 265, America's Center
9:00 AM - 12:00 PM	P-IE Section Symposium: Charles Valentine Riley: Founding Advocate for Entomology	Room 240, America's Center
9:00 AM - 11:45 AM	Member Symposium: Advocating Entomopathogens for Sustainable Agriculture	Room 264, America's Center
9:00 AM - 11:30 AM	Member Symposium: Catching the Right Career: An Entomology Employment Expedition	Room 230, America's Center
9:00 AM - 11:30 AM	Member Symposium: Contributions of Daniel Potter to Science, Students, and IPM	Room 126, America's Center
9:00 AM - 12:00 PM	Member Symposium: Effects of Land Management and Disturbance on Wild Bee Communities	Room 231, America's Center
9:00 AM - 11:30 AM	Member Symposium: Entomology Advocacy as a Conduit for Biodiversity Conservation: 7th Latin American/Hispanic Symposium	Room 127, America's Center
9:00 AM - 11:45 AM	Member Symposium: Monitoring and Managing the Fall Armyworm, <i>Spodoptera frugiperda</i> in Africa and Asia	Room 267, America's Center

Daily Schedule by Date & Time

TUESDAY, NOVEMBER 19

TIME	SESSION/FUNCTION	LOCATION
9:00 AM - 11:00 AM	Member Symposium: Promoting Women's Research: Global Food Security	Room 125, America's Center
9:00 AM - 12:00 PM	Member Symposium: Synthesizing Microevolution of Plant Defenses against Insects across Disciplines	Room 262, America's Center
9:00 AM - 12:00 PM	Member Symposium: The Intersection of Industry and Research: Semiochemical Solutions for Major Agricultural Pests	Room 280, America's Center
9:00 AM - 11:00 AM	Member Symposium: The Staphylinidae Verses: 63,000 Stanzas Long	Room 130, America's Center
9:00 AM - 11:50 AM	10-min: MUVE, Termites, Ants, and Stinging Pests	Room 122, America's Center
9:00 AM - 11:10 AM	10-min: MUVE, Veterinary and Forensic Entomology	Room 132, America's Center
9:00 AM - 12:00 PM	10-min: PBT, Bee Physiology and Health	Room 274, America's Center
9:00 AM - 11:50 AM	10-min: P-IE, Ecology, General	Room 232, America's Center
9:00 AM - 10:50 AM	10-min: P-IE, Host-Plant Resistance	Room 276, America's Center
9:00 AM - 11:50 AM	10-min: P-IE, Invasive Species	Room 241, America's Center
9:00 AM - 12:00 PM	10-min: P-IE, Novel Tools and Products	Room 275, America's Center
9:00 AM - 11:50 AM	10-min: SysEB, Diversity, Evolution, and Biology of Ants	Room 124, America's Center
9:00 AM - 11:20 AM	10-min: SysEB, Evolution, Diversity, and Morphology of Coleoptera	Room 123, America's Center
9:00 AM - 6:30 PM	Infographic: All Sections 1	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Poster: MUVE 1	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Poster: PBT 1	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Poster: P-IE 1	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Poster: SysEB 1	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Virtual Infographics: All Sections	Exhibit Hall 1 & 2, America's Center
9:00 AM - 6:30 PM	Virtual Posters: All Sections 1	Exhibit Hall 1 & 2, America's Center
9:00 AM - 5:00 PM	Exhibit Hall	Exhibit Hall 1 & 2, America's Center
9:00 AM - 3:00 PM	Tour: Forest Park "Meet Me in St. Louis"	Washington Lobby, America's Center
9:30 AM - 11:30 AM	Insect Systematics and Diversity Editorial Board Meeting	Aubert/Parkview, Marriott Grand
10:00 AM - 12:00 PM	ESA Awards and Honors Committee Meeting	Portland, Marriott Grand
10:00 AM - 12:00 PM	ESA Education and Outreach Committee Meeting	Benton, Marriott Grand
10:15 AM - 12:30 PM	Tour: Bayer Research and Development Center	Washington Lobby, America's Center
10:45 AM - 12:15 PM	Program Workshop: If They're Laughing, They're Listening	Room 261, America's Center
12:00 PM - 1:00 PM	Past Presidents' Luncheon	Hawthorne/Lucas/Flora, Marriott Grand
12:15 PM - 1:15 PM	Lunch & Learn: How to Advocate for Your Publications	Room 131, America's Center
12:15 PM - 1:15 PM	Lunch & Learn: Getting Your Foot in the Door for Section Leadership Positions	Room 132, America's Center
12:15 PM - 1:15 PM	Lunch & Learn: So, You're on the Academic Job Market: Drafting Memorable Statements, Secrets from the Search Committee, and Advice from Recent Hires	Room 130, America's Center
12:15 PM - 12:45 PM	National Insect Photo Salon	Room 280, America's Center
12:30 PM - 4:30 PM	Workshop: Entomological Edutainment and Portal to the Public	Washington Lobby, America's Center
12:30 PM - 3:15 PM	Tour: Bayer Research and Development Center	Washington Lobby, America's Center
1:00 PM - 4:00 PM	Student Debates - Synergisms in Science: Climate Change and Integrated Pest Management (IPM) through the Lens of Communication	America's Ballroom, America's Center
1:00 PM - 2:00 PM	ESA Diversity and Inclusion Committee Meeting	Benton, Marriott Grand
1:00 PM - 2:00 PM	USDA-ARS All Hands Meeting	Room 123, America's Center
1:30 PM - 5:30 PM	Program Symposium: Insect Decline in the Anthropocene	Room 223/224/225/226, America's Center

Daily Schedule by Date & Time

TUESDAY, NOVEMBER 19

TIME	SESSION/FUNCTION	LOCATION
1:30 PM - 5:30 PM	Program Workshop: ComSciCon Entomology	Room 275, America's Center
1:30 PM - 5:15 PM	MUVE Section Symposium: Indoor Pests and Human Health: Advocating for Interdisciplinary Interactions	Room 260, America's Center
1:30 PM - 5:30 PM	PBT Section Symposium: Mechanisms of Chemical Adaptation to Support Pest and Pollinator Management	Room 266, America's Center
1:30 PM - 5:00 PM	PBT Section Symposium: New Insecticidal Proteins: Novel Methods for Discovery and Characterization	Room 267, America's Center
1:30 PM - 5:30 PM	P-IE Section Symposium: Advocating for Coexistence of IRM and IPM	Room 242, America's Center
1:30 PM - 5:30 PM	P-IE Section Symposium: Advocating for IPM in a Dynamic Agricultural World	Room 241, America's Center
1:30 PM - 5:30 PM	P-IE Section Symposium: Generalist Arthropod Biological Control Agents: Effective, but Are They Safe?	Room 232, America's Center
1:30 PM - 5:20 PM	P-IE Section Symposium: How to Speak for the Pollinators: Using Big Data to Manage and Conserve Pollinator Communities	Room 240, America's Center
1:30 PM - 5:30 PM	P-IE Section Symposium: Using Integrated Observational, Mechanistic, and Experimental Research Approaches to Drive Conservation Decisions: Lessons from Butterfly Species in Peril	Room 262, America's Center
1:30 PM - 5:30 PM	SysEB Section Symposium: Bugs in Technicolor: How Color Research Advocates for Entomology	Room 230, America's Center
1:30 PM - 5:30 PM	Member Symposium: Emerging Topics in Honey Bee Research: Growing Needs to Communicate and Advocate for Research-Based Information	Room 231, America's Center
1:30 PM - 4:30 PM	Member Symposium: Entomological Bycatch: Plenty to Advocate For	Room 265, America's Center
1:30 PM - 5:30 PM	Member Symposium: Growing the Next Generation of Entomology Advocates: A Focus on Entomology Education with Middle and High School Students	Room 261, America's Center
1:30 PM - 4:50 PM	Member Symposium: He pua no ka wēkiu: Honoring the Life and Work of Roger Vargas	Room 122, America's Center
1:30 PM - 5:30 PM	Member Symposium: New Frontiers in the Study of Insect Vectors of Plant Pathogens	Room 127, America's Center
1:30 PM - 4:40 PM	Member Symposium: Novel Modes of Delivering Chemicals and Control Agents to Manage Urban Pests and Vectors More Effectively	Room 280, America's Center
1:30 PM - 4:40 PM	Organized Meeting: IOBC NRS Annual Meeting: Early Career Professionals Advocating Biological Control	Room 131, America's Center
1:30 PM - 4:30 PM	Organized Meeting: Sacred Order of the Geniculate Antennae (SOGA) Weevil Workers	Room 121, America's Center
1:30 PM - 4:50 PM	Organized Meeting: WERA 1021: An Update on Biological Control Research Against Spotted-Wing Drosophila (<i>Drosophila suzukii</i>)	Room 124, America's Center
1:30 PM - 5:10 PM	10-min: MUVE, Vector Biology	Room 120, America's Center
1:30 PM - 4:30 PM	10-min: PBT, Genetics and Genomics	Room 274, America's Center
1:30 PM - 3:30 PM	10-min: SysEB, Pests, Invasives, and Biological Control	Room 126, America's Center
1:30 PM - 2:30 PM	Annual Meeting of the Society of Regulatory Entomologists	Room 263, America's Center
2:00 PM - 3:50 PM	10-min: SysEB, Systematics, Ecology, and Morphology of Lepidoptera	Room 130, America's Center
2:00 PM - 4:00 PM	ACE Public Health Meeting	Portland, Marriott Grand
2:30 PM - 5:30 PM	Member Symposium: Regulatory Entomology: Many Hands, One Mind	Room 263, America's Center
2:00 PM - 3:00 PM	ESA Early Career Professionals Committee Meeting	Benton, Marriott Grand
3:00 PM - 6:00 PM	ESA Publications Council Meeting	Aubert/Parkview, Marriott Grand
3:30 PM - 5:20 PM	10-min: SysEB, Systematics, Evolution, and Diversity of Hymenoptera	Room 126, America's Center
3:30 PM - 5:00 PM	Organized Meeting: International Branch Meeting	Room 132, America's Center
3:30 PM - 5:00 PM	ESA Full Section Governing Council Meeting	Benton, Marriott Grand
4:00 PM - 5:10 PM	10-min: SysEB, Evolution and Diversity of Odonata and Polyneoptera	Room 130, America's Center
5:00 PM - 6:00 PM	Global Locust Initiative Networking Event	Benton, Marriott Grand

Daily Schedule by Date & Time

TUESDAY, NOVEMBER 19

TIME	SESSION/FUNCTION	LOCATION
5:00 PM - 7:00 PM	IOBC-NRS Business Meeting and Mixer	Room 131, America's Center
5:00 PM - 6:30 PM	Linnaean Games - Final Rounds	America's Ballroom, America's Center
5:30 PM - 6:30 PM	Poster and Infographic Social Hour	Exhibit Hall 1 & 2, America's Center
6:00 PM - 8:00 PM	Organized Meeting: IUSSI North American Section Business Meeting	Room 124, America's Center
6:00 PM - 9:00 PM	Organized Meeting: Korean Young Entomologists (KYE)	Room 127, America's Center
6:30 PM - 9:00 PM	Overseas Chinese Entomologists Association (OCEA) Meeting	Room 120, America's Center
6:30 PM - 7:30 PM	Student Awards Ceremony	America's Ballroom, America's Center
6:30 PM - 7:30 PM	Film Screening: The Love Bugs	Room 223/224/225/226, America's Center
7:00 PM - 9:00 PM	Organized Meeting: North American Dipterists Society (NADS) Meeting	Room 125, America's Center
7:00 PM - 9:00 PM	Organized Meeting: Society of Overseas Nepalese Entomologists Meeting	Room 126, America's Center
7:00 PM - 9:00 PM	Chalcidoidea Book Workshop	Benton, Marriott Grand
7:00 PM - 8:00 PM	ESA Editor's Reception	Hawthorne/Lucas/Flora, Marriott Grand
8:00 PM - 10:00 PM	Organized Meeting: The Coleopterists Society General Meeting	Room 130, America's Center
8:00 PM - 9:00 PM	ESA Governing Board Reception	Statler Room, Marriott Grand
8:00 PM - 9:30 PM	ECP Mixer	Shark Bar at Ballpark Village
8:00 PM - 11:00 PM	Student Reception	Ballpark Village
8:20 PM - 10:00 PM	Korean Young Entomologists (KYE) Mixer	Room 127, America's Center

WEDNESDAY, NOVEMBER 20

TIME	SESSION/FUNCTION	LOCATION
7:00 AM - 8:00 AM	MUVE Section Business Meeting	Room 123, America's Center
7:00 AM - 8:00 AM	Open P-IE Section Governing Council and Member Feedback Session	Room 263, America's Center
7:00 AM - 12:00 PM	Presentation Preview Room (PPR)/Speaker Ready Room	Room 106, America's Center
7:00 AM - 12:00 PM	Registration and Information Center	Washington Lobby, America's Center
8:00 AM - 9:00 AM	Closing Plenary Session	America's Ballroom, America's Center
8:00 AM - 5:00 PM	Workshop: ARM Software Training for the Industry	Room 262, America's Center
9:00 AM - 12:20 PM	Program Symposium: Working with the Fourth Estate: Building Bridges between Science and the Media	Room 240, America's Center
9:00 AM - 12:00 PM	Workshop: Cultivating an Inclusive Environment: Recognizing and Responding to Implicit Bias	Room 223/224/225/226, America's Center
9:00 AM - 4:00 PM	Workshop: Using Generalist Arthropod Biological Control Agents: Ensuring Effectiveness and Safety	Room 261, America's Center
9:00 AM - 11:50 AM	MUVE Section Symposium: Emerging and Neglected Infectious Diseases: Innovative Vector Research	Room 120, America's Center
9:00 AM - 12:00 PM	MUVE Section Symposium: Vectors, Hosts, and Pathogens: Advocating Cross-System Dialog and Research in Entomology	Room 121, America's Center
9:00 AM - 11:30 AM	P-IE Section Symposium: Advocating for Entomological Solutions to the Grand Challenge of Global Food Security in the 21st Century	Room 231, America's Center
9:00 AM - 12:00 PM	P-IE Section Symposium: Transmission Ecology of Vector-borne Phytopathogens	Room 263, America's Center
9:00 AM - 11:45 AM	SysEB Section Symposium: 20 Years of Biological Survey in the Southern Appalachians: An Update on the Smokies All Taxa Biodiversity Inventory (ATBI)	Room 127, America's Center

Daily Schedule by Date & Time

WEDNESDAY, NOVEMBER 20

TIME	SESSION/FUNCTION	LOCATION
9:00 AM - 11:00 AM	Member Symposium: 21st Century Outreach: Innovative and Inclusive Outreach and Extension	Room 260, America's Center
9:00 AM - 12:00 PM	Member Symposium: "A Microbe, an Herbivore, and a Plant Walk into a Field..." Microbes in Plant-Herbivore Interactions	Room 267, America's Center
9:00 AM - 11:00 AM	Member Symposium: Analyzing Insect Development: Where Do We Stand? Expansions and Limitations in the Field of Forensic Entomology	Room 266, America's Center
9:00 AM - 12:00 PM	Member Symposium: Applications of Molecular Ecology and Ecological Genomics to Agriculture and Pest Management	Room 276, America's Center
9:00 AM - 12:00 PM	Member Symposium: Cuticular Hydrocarbons in Insect Communication and Physiology	Room 275, America's Center
9:00 AM - 11:10 AM	Member Symposium: Recent Advances in the Study of Neuropterida	Room 122, America's Center
9:00 AM - 12:00 PM	Member Symposium: Systematics and Diversity of the Tenebrionoidea	Room 125, America's Center
9:00 AM - 10:50 AM	10-min: MUVE, Bed Bugs and Cockroaches	Room 130, America's Center
9:00 AM - 10:30 AM	10-min: MUVE, Outreach, Urban Insect Control, and Insects as Food	Room 131, America's Center
9:00 AM - 11:30 AM	10-min: MUVE, Vector Control	Room 123, America's Center
9:00 AM - 10:40 AM	10-min: PBT, Microbe Interactions and Chemical Ecology	Room 274, America's Center
9:00 AM - 12:00 PM	10-min: P-IE, IPM, Field Crops 1	Room 264, America's Center
9:00 AM - 12:10 PM	10-min: P-IE, IPM, Horticulture 1	Room 232, America's Center
9:00 AM - 12:20 PM	10-min: P-IE, Resistance Management	Room 230, America's Center
9:00 AM - 10:30 AM	10-min: P-IE, Vectors of Plant Disease	Room 265, America's Center
9:00 AM - 11:10 AM	10-min: SysEB, Evolution, Behavior, Ecology, and Genetics	Room 126, America's Center
9:00 AM - 11:40 AM	10-min: SysEB, Systematics, Genetics, and Morphology of Bees	Room 124, America's Center
9:00 AM - 2:00 PM	Infographic: All Sections 2	Exhibit Hall 1 & 2, America's Center
9:00 AM - 2:00 PM	Poster: MUVE 2	Exhibit Hall 1 & 2, America's Center
9:00 AM - 2:00 PM	Poster: PBT 2	Exhibit Hall 1 & 2, America's Center
9:00 AM - 2:00 PM	Poster: P-IE 2	Exhibit Hall 1 & 2, America's Center
9:00 AM - 2:00 PM	Poster: SysEB 2	Exhibit Hall 1 & 2, America's Center
9:00 AM - 2:00 PM	Virtual Posters: All Sections 2	Exhibit Hall 1 & 2, America's Center
9:00 AM - 2:00 PM	Exhibit Hall	Exhibit Hall 1 & 2, America's Center
9:00 AM - 10:00 AM	World of Insects Calendar Committee Meeting	Laclede Boardroom, Marriott Grand
9:30 AM - 10:30 AM	Entomology 2020 Program Committee Meeting	Room 280, America's Center
10:00 AM - 12:00 PM	Soybean Gall Midge Research Update and Planning Meeting	Room 132, America's Center
11:00 AM - 12:00 PM	Student Affairs Committee Meeting	Room 200, America's Center
12:15 PM - 1:15 PM	Lunch & Learn: A Beginner's Introduction to 3D Printing for Entomologists	Room 131, America's Center
12:15 PM - 1:15 PM	Lunch & Learn: What's Your Story? Tips and Tricks for Telling Compelling Entomology	Room 130, America's Center
12:15 PM - 1:15 PM	Entomological Society of Washington	Room 241, America's Center
12:30 PM - 2:00 PM	ICE Council Meeting	Laclede Boardroom, Marriott Grand
12:30 PM - 1:30 PM	Poster and Infographic Social Hour	Exhibit Hall 1 & 2, America's Center
1:30 PM - 5:30 PM	PBT Section Symposium: Cross-Pollination across Sectors: A Forum on Pollinator Health and Safety	Room 266, America's Center
1:30 PM - 5:30 PM	PBT Section Symposium: From Fat to Fact: Recent Insights on Insect Lipid Metabolism	Room 267, America's Center
1:30 PM - 5:15 PM	P-IE Section Symposium: Advocating for Endangered Insect Species - Policy, Science, Tools and Practical Considerations	Room 231, America's Center
1:30 PM - 5:30 PM	P-IE Section Symposium: Invasion of the Spotted Lanternfly, <i>Lycorma delicatula</i> , in North America	Room 263, America's Center

Daily Schedule by Date & Time

WEDNESDAY, NOVEMBER 20

TIME	SESSION/FUNCTION	LOCATION
1:30 PM - 5:00 PM	P-IE Section Symposium: The Larry Larson Symposium: Fall Armyworm, <i>Spodoptera frugiperda</i> (J.E. Smith), Invasion in Africa and Asia: A Cooperative Effort to Design Integrated Pest Management Programs	Room 265, America's Center
1:30 PM - 5:30 PM	Member Symposium: Advances in Hemipteran Biology and Control	Room 132, America's Center
1:30 PM - 5:20 PM	Member Symposium: Advocate with Your Pen (or Keyboard): Writing about Entomology for All Audiences	Room 241, America's Center
1:30 PM - 5:30 PM	Member Symposium: Advocating for Entomology through Societal Impacts: Maintaining the Relevance and Visibility of Entomology in a Changing World	Room 122, America's Center
1:30 PM - 5:30 PM	Member Symposium: Advocating for Insects as Food and Feed	Room 242, America's Center
1:30 PM - 5:10 PM	Member Symposium: Finding Common Ground: Non-chemical Pest-Management to Protect Organic and Conventional Crops	Room 264, America's Center
1:30 PM - 5:30 PM	Member Symposium: Next-Gen Scientists: Mentorship and Teaching Strategies to Advocate for Undergraduate Entomology Education	Room 260, America's Center
1:30 PM - 4:40 PM	Member Symposium: Population Genetics and Pest Control: Advocating a Leading Role for Entomologists	Room 280, America's Center
1:30 PM - 4:30 PM	Member Symposium: Recent Approaches to Studying Invertebrate Responses to Rapid Environmental Change	Room 125, America's Center
1:30 PM - 5:30 PM	Member Symposium: Recent Innovations in Post-Harvest Entomology: Improving Food Security in an Era of Globalized Agriculture	Room 123, America's Center
1:30 PM - 4:00 PM	Member Symposium: Social Resilience: Understanding How Environmental Stressors Impact Social Insects, from the Individual to the Collective Scales	Room 126, America's Center
1:30 PM - 4:10 PM	Member Symposium: Tick Endosymbionts: Obligatory, Facultative, or Idiosyncratic?	Room 120, America's Center
1:30 PM - 5:00 PM	Member Symposium: Why and How to Advocate for the Science of Insect Control	Room 232, America's Center
1:30 PM - 5:00 PM	10-min: PBT, Molecular and Biological Control	Room 274, America's Center
1:30 PM - 2:40 PM	10-min: P-IE, Transgenic Crops	Room 230, America's Center

NOTES:

Daily Schedule by Scientific Program

SUNDAY, NOVEMBER 17

SESSION	TIME	LOCATION
PLENARIES		
Opening Plenary Session with Keynote by Erica McAlister	5:30 PM - 7:30 PM	America's Ballroom, America's Center
PROGRAM SYMPOSIA		
Marketing Entomology in the 21st Century: Delivering Knowledge, Changing Attitudes, and Encouraging Action	8:00 AM - 11:45 AM	Room 240, America's Center
Advocating Diversity Among Entomologists: If Insects Are Diverse, We Should Be, Too!	1:30 PM - 5:30 PM	Room 240, America's Center
WORKSHOPS		
Program Workshop: From Instars to Adults: Implementing Outreach Activities Across Different Education Levels and Audiences	8:00 AM - 12:00 PM	Room 261, America's Center
Classical Biological Control of Weeds: Petition Development, Improvement, Submission, and Review	1:30 PM - 5:30 PM	Room 261, America's Center
SECTION SYMPOSIA		
MUVE Section Symposium: Can We Really Eliminate Mosquito-Borne Disease in 21st Century?	8:00 AM - 11:15 AM	Room 120, America's Center
PBT Section Symposium: Insecticidal RNAi: From Targets to Field Applications	8:00 AM - 11:40 AM	Room 274, America's Center
PBT Section Symposium: Novel Applications and Risk Management of Genetic Technologies for Pest Management	8:00 AM - 11:00 AM	Room 275, America's Center
PBT Section Symposium: Odorant Reception and Perception in Mosquitoes and Flies	8:00 AM - 12:00 PM	Room 267, America's Center
P-IE Section Symposium: Advocating for Forest Entomology through Teaching and Extension	8:00 AM - 10:00 AM	Room 230, America's Center
MUVE Section Symposium: Advocate Research and Development of Insect Repellents	1:30 PM - 4:50 PM	Room 120, America's Center
PBT Section Symposium: Insecticidal RNAi: New Invertebrate Targets, Mode of Action, and Resistance	1:30 PM - 5:30 PM	Room 274, America's Center
PBT Section Symposium: INsecticide TArgets and Resistance (INSTAR) Summit	1:30 PM - 5:30 PM	Room 266, America's Center
P-IE Section Symposium: "Callow's" and "Pre-Imaginal" Professionals of Pollination Research	1:30 PM - 4:15 PM	Room 262, America's Center
P-IE Section Symposium: Advocacy in Action: Tackling Invasive Species through Collaboration, Policy, and Public Engagement	1:30 PM - 5:10 PM	Room 241, America's Center
SysEB Section Symposium: The Road to Sociality: Integrated Concepts of Social Behavior in Insects	1:30 PM - 5:30 PM	Room 132, America's Center
SysEB Section Symposium: What Everyone Ought to Know about Insect Biodiversity in the Urban Environment	1:30 PM - 4:30 PM	Room 123, America's Center
MEMBER SYMPOSIA		
Advocate Entomology without the Jargon	8:00 AM - 10:30 AM	Room 127, America's Center
Advocate for All Entomologists! Insect Scientist Stories from Beyond Academia	8:00 AM - 11:10 AM	Room 260, America's Center
Advocate Sharing: The Science of Unpublished Results in Entomology	8:00 AM - 11:30 AM	Room 123, America's Center
Caterpillars in a Tritrophic World: Adaptations and Counteradaptations	8:00 AM - 11:45 AM	Room 231, America's Center
Preparing to Sequence the Planet - Starting with our Insect Friends	8:00 AM - 12:00 PM	Room 241, America's Center

Daily Schedule by Scientific Program

Unabashed Advocacy of Arthropods: Living Tribute to Justin O. Schmidt	8:00 AM - 11:35 AM	Room 125, America's Center
Arthropod-Vertebrate Molecular Interactions and Pathogen Emergence	10:00 AM - 12:00 PM	Room 121, America's Center
Defying the Decline: Applied and Research-Based Conservation Initiatives Making a Difference in Sustaining Insect Biodiversity	1:30 PM - 4:30 PM	Room 263, America's Center
Forensic Entomology	1:30 PM - 4:00 PM	Room 121, America's Center
Latest Advancements and Challenges in Insect Rearing and Testing	1:30 PM - 5:10 PM	Room 275, America's Center
Linking Insect Movement Ecology with Applied Pest Management	1:30 PM - 3:30 PM	Room 231, America's Center
Mite Evolution	1:30 PM - 5:30 PM	Room 126, America's Center
New Discoveries and Practical Approaches to Greenhouse Insect Management	1:30 PM - 5:30 PM	Room 242, America's Center
Semiochemicals of Wood-Boring Beetles	1:30 PM - 5:10 PM	Room 230, America's Center
Space, Time, and Disease: Vectors across Multiple Spatial and Temporal Scales	1:30 PM - 5:20 PM	Room 276, America's Center
<i>Spodoptera frugiperda</i> in Africa and Asia: Potential for Novel IPM	1:30 PM - 4:00 PM	Room 260, America's Center
The Show-Me State: Current Entomological Research and Conservation in Missouri	1:30 PM - 5:10 PM	Room 122, America's Center

ORGANIZED MEETINGS

Current Advances in Acarology	8:00 AM - 12:00 PM	Room 126, America's Center
International Society of Hymenopterists Symposium and Business Meeting	1:30 PM - 5:30 PM	Room 130, America's Center
Small Orders, Big Ideas	1:30 PM - 4:30 PM	Room 125, America's Center
SOLA Scarab Workers	1:30 PM - 5:30 PM	Room 127, America's Center

LUNCH AND LEARNS

Selling Yourself and Building Your Brand as an Early Career Professional	12:15 PM - 1:15 PM	Room 130, America's Center
The Journal of Entomological Education and Outreach	12:15 PM - 1:15 PM	Room 131, America's Center

3-MIN PRESENTATIONS

All Sections	10:00 AM - 11:15 AM	Room 124, America's Center
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10-MIN PAPERS

PBT, Insecticides and Resistance	8:00 AM - 12:00 PM	Room 266, America's Center
P-IE, Biocontrol, Parasitoids, and Pathogens	8:00 AM - 11:40 AM	Room 232, America's Center
P-IE, Chemical Ecology	8:00 AM - 9:50 AM	Room 264, America's Center
P-IE, Ecology and Climate Change	8:00 AM - 10:30 AM	Room 265, America's Center
P-IE, IPM, Horticulture 2	8:00 AM - 11:20 AM	Room 263, America's Center
P-IE, Pollination	8:00 AM - 11:30 AM	Room 242, America's Center
MUVE, Vector Surveillance	10:00 AM - 11:10 AM	Room 122, America's Center
PBT, Physiology	1:30 PM - 5:20 PM	Room 280, America's Center
P-IE, Behavior and Apiculture	1:30 PM - 3:10 PM	Room 265, America's Center
P-IE, Biocontrol, General and Predators	1:30 PM - 5:20 PM	Room 232, America's Center
P-IE, IPM, Field Crops 2	1:30 PM - 2:50 PM	Room 264, America's Center
SysEB, Diversity, Evolution, and Biology of Hemiptera	1:30 PM - 3:20 PM	Room 124, America's Center
P-IE, Stored Product Pests	4:00 PM - 5:00 PM	Room 231, America's Center

Daily Schedule by Scientific Program

MONDAY, NOVEMBER 18

SESSION	TIME	LOCATION
PLENARIES		
Antlion Pit Demonstration Day	9:00 AM - 11:00 AM	Exhibit Hall 1 & 2, America's Center
Antlion Pit Presentation Session	1:00 PM - 3:00 PM	America's Ballroom, America's Center
WORKSHOPS		
Program Workshop: Start Advocating Entomology on Social Media!	8:00 AM - 9:50 AM 10:00 AM - 11:50 AM	Room 261, America's Center
Work on Your Social Life: Starting Social Science Collaborations	8:00 AM - 11:00 AM	Room 225/226, America's Center
ORGANIZED MEETINGS		
Highlights of Medical, Urban, and Veterinary Entomology & MUVE Business Meeting	2:30 PM - 5:30 PM	Room 263/264, America's Center
Physiology, Biochemistry, and Toxicology (PBT) Section Meeting Networking Session	2:30 PM - 5:30 PM	Room 260, America's Center
Plant-Insect Ecosystem (P-IE) Section Networking, Business, and Learning Session (All Welcome)	2:30 PM - 5:30 PM	Room 230/231, America's Center
Systematics, Evolution, and Biodiversity (SysEB) Section Business Meeting	2:30 PM - 5:30 PM	Room 120/121/122, America's Center
LUNCH AND LEARNS		
Funding Opportunities at the National Science Foundation	12:15 PM - 1:15 PM	Room 131, America's Center
Navigating Cultural Diversity in Scientific Research, Education, and Leadership	12:15 PM - 1:15 PM	Room 130, America's Center
STUDENT 3-MIN PRESENTATION COMPETITION		
Student 3-min: All Sections 1	8:00 AM - 9:10 AM	Room 132, America's Center
Student 3-min: All Sections 2	9:30 AM - 10:40 AM	Room 132, America's Center
STUDENT 10-MIN PAPER COMPETITION		
Grad 10-min: MUVE, Disease Transmission	8:00 AM - 9:30 AM	Room 120, America's Center
Grad 10-min: MUVE, Ecology and Behavior 1	8:00 AM - 9:30 AM	Room 121, America's Center
Grad 10-min: MUVE, Insecticide Efficacy and Resistance 1	8:00 AM - 9:40 AM	Room 122, America's Center
Grad 10-min: MUVE, Life History	8:00 AM - 10:00 AM	Room 123, America's Center
Grad 10-min: PBT, Biology	8:00 AM - 10:00 AM	Room 275, America's Center
Grad 10-min: PBT, Molecular and Cellular Biology 1	8:00 AM - 9:40 AM	Room 266, America's Center
Grad 10-min: PBT, Molecular and Cellular Biology 3	8:00 AM - 9:40 AM	Room 267, America's Center
Grad 10-min: PBT, Toxicity 1	8:00 AM - 9:30 AM	Room 274, America's Center
Grad 10-min: P-IE, Biocontrol of Insects 1	8:00 AM - 10:00 AM	Room 264, America's Center
Grad 10-min: P-IE, Biocontrol of Insects 2	8:00 AM - 10:00 AM	Room 265, America's Center
Grad 10-min: P-IE, Chemical Ecology	8:00 AM - 10:00 AM	Room 241, America's Center
Grad 10-min: P-IE, Climate Change	8:00 AM - 9:20 AM	Room 240, America's Center
Grad 10-min: P-IE, Ecology 1	8:00 AM - 10:00 AM	Room 262, America's Center
Grad 10-min: P-IE, Ecology 2	8:00 AM - 10:00 AM	Room 263, America's Center
Grad 10-min: P-IE, Invasive Species	8:00 AM - 10:00 AM	Room 280, America's Center
Grad 10-min: P-IE, IPM Field Crops 1	8:00 AM - 9:50 AM	Room 230, America's Center
Grad 10-min: P-IE, IPM Field Crops 3	8:00 AM - 9:40 AM	Room 231, America's Center
Grad 10-min: P-IE, IPM Field Crops 5	8:00 AM - 9:40 AM	Room 232, America's Center

Daily Schedule by Scientific Program

Grad 10-min: P-IE, Pollination 1	8:00 AM - 9:40 AM	Room 223, America's Center
Grad 10-min: P-IE, Pollination 2	8:00 AM - 9:30 AM	Room 224, America's Center
Grad 10-min: P-IE, Resistance Management	8:00 AM - 9:30 AM	Room 242, America's Center
Grad 10-min: P-IE, Vectors 1	8:00 AM - 9:30 AM	Room 260, America's Center
Grad 10-min: SysEB, Behavior	8:00 AM - 9:50 AM	Room 125, America's Center
Grad 10-min: SysEB, Biogeography and Disturbance	8:00 AM - 9:40 AM	Room 127, America's Center
Grad 10-min: SysEB, Evolution 1	8:00 AM - 9:20 AM	Room 130, America's Center
Grad 10-min: SysEB, Morphology and Phylogeny	8:00 AM - 9:30 AM	Room 124, America's Center
Grad 10-min: SysEB, Phylogenetics 2	8:00 AM - 10:00 AM	Room 131, America's Center
Undergrad 10-min: PBT and MUVE 1	8:00 AM - 9:20 AM	Room 276, America's Center
Undergrad 10-min: SysEB 1	8:00 AM - 9:40 AM	Room 126, America's Center
Grad 10-min: MUVE, Diversity	10:10 AM - 11:40 AM	Room 120, America's Center
Grad 10-min: MUVE, Ecology and Behavior 2	10:10 AM - 11:40 AM	Room 121, America's Center
Grad 10-min: MUVE, Insecticide Efficacy and Resistance 2	10:10 AM - 11:50 AM	Room 122, America's Center
Grad 10-min: MUVE, Molecular and Cellular Biology	10:10 AM - 12:00 PM	Room 123, America's Center
Grad 10-min: PBT, Insecticide Resistance	10:10 AM - 11:40 AM	Room 275, America's Center
Grad 10-min: PBT, Molecular and Cellular Biology 2	10:10 AM - 11:50 AM	Room 266, America's Center
Grad 10-min: PBT, Pollinator Biology and Ecology	10:10 AM - 11:20 AM	Room 267, America's Center
Grad 10-min: PBT, Toxicity 2	10:10 AM - 11:40 AM	Room 274, America's Center
Grad 10-min: P-IE, Apiculture	10:10 AM - 11:40 AM	Room 223, America's Center
Grad 10-min: P-IE, Behavior	10:10 AM - 12:00 PM	Room 263, America's Center
Grad 10-min: P-IE, Biocontrol of Insects 3	10:10 AM - 12:10 PM	Room 264, America's Center
Grad 10-min: P-IE, Biocontrol of Plants	10:10 AM - 11:30 AM	Room 265, America's Center
Grad 10-min: P-IE, Ecology 3	10:10 AM - 12:00 PM	Room 262, America's Center
Grad 10-min: P-IE, Forests	10:10 AM - 12:00 PM	Room 280, America's Center
Grad 10-min: P-IE, Host Plant Resistance	10:10 AM - 12:10 PM	Room 242, America's Center
Grad 10-min: P-IE, IPM Field Crops 2	10:10 AM - 12:10 PM	Room 230, America's Center
Grad 10-min: P-IE, IPM Field Crops 4	10:10 AM - 12:00 PM	Room 231, America's Center
Grad 10-min: P-IE, IPM Horticulture	10:10 AM - 12:00 PM	Room 232, America's Center
Grad 10-min: P-IE, Molecular and Cell Biology / Novel Tools	10:10 AM - 11:40 AM	Room 241, America's Center
Grad 10-min: P-IE, Pollination 3	10:10 AM - 12:00 PM	Room 224, America's Center
Grad 10-min: P-IE, Vectors 2	10:10 AM - 11:30 AM	Room 260, America's Center
Grad 10-min: SysEB, Evolution 2	10:10 AM - 12:00 PM	Room 130, America's Center
Grad 10-min: SysEB, Phylogenetics 1	10:10 AM - 11:40 AM	Room 124, America's Center
Grad 10-min: SysEB, Phylogenetics 3	10:10 AM - 11:40 AM	Room 131, America's Center
Grad 10-min: SysEB, Symbionts	10:10 AM - 11:30 AM	Room 125, America's Center
Grad 10-min: SysEB, Taxonomy and Diversity	10:10 AM - 11:50 AM	Room 127, America's Center
Undergrad 10-min: PBT and MUVE 2	10:10 AM - 11:50 AM	Room 276, America's Center
Undergrad 10-min: P-IE	10:10 AM - 12:00 PM	Room 240, America's Center
Undergrad 10-min: SysEB 2	10:10 AM - 12:00 PM	Room 126, America's Center

STUDENT POSTER AND INFOGRAPHIC COMPETITION

Grad Infographic: MUVE and PBT	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Grad Infographic: P-IE 1	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Grad Infographic: P-IE 2	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Grad Infographic: SysEB	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Grad Poster: MUVE 1	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Grad Poster: MUVE 2	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center

Daily Schedule by Scientific Program

Grad Poster: MUVE 3	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Grad Poster: PBT 1	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Grad Poster: PBT 2	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Grad Poster: PBT 3	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Grad Poster: PBT 4	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Grad Poster: P-IE, Biological Control	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Grad Poster: P-IE, Ecology 1	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Grad Poster: P-IE, Ecology 2	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Grad Poster: P-IE, IPM 1	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Grad Poster: P-IE, IPM 2	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Grad Poster: P-IE, IPM 3	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Grad Poster: P-IE, Plant Disease Vectors	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Grad Poster: P-IE, Pollinator	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Grad Poster: SysEB 1	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Grad Poster: SysEB 2	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Grad Poster: SysEB 3	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Undergrad Poster: MUVE 1	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Undergrad Poster: MUVE 2	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Undergrad Poster: PBT 1	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Undergrad Poster: PBT 2	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Undergrad Poster: P-IE 1	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Undergrad Poster: P-IE 2	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Undergrad Poster: P-IE 3	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Undergrad Poster: SysEB 1	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Undergrad Poster: SysEB 2	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Undergrad Poster: SysEB 3	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center

STUDENT VIRTUAL POSTER AND VIRTUAL INFOGRAPHIC COMPETITION

Student Virtual Infographic: All Sections	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Grad Virtual Poster: MUVE, PBT, and SysEB	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Grad Virtual Poster: P-IE	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Undergrad Virtual Poster: MUVE, PBT, and SysEB	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Undergrad Virtual Poster: P-IE	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center

Daily Schedule by Scientific Program

TUESDAY, NOVEMBER 19

SESSION	TIME	LOCATION
PLENARIES		
ESA Professional Awards Breakfast Featuring the Founders' Memorial Lecture	7:30 AM - 8:45 AM	America's Ballroom, America's Center
Student Debates - Synergisms in Science: Climate Change and Integrated Pest Management (IPM) through the Lens of Communication	1:00 PM - 4:00 PM	America's Ballroom, America's Center
Student Awards Ceremony	6:30 PM - 7:30 PM	America's Ballroom, America's Center
PROGRAM SYMPOSIA		
Insect Decline in the Anthropocene	1:30 PM - 5:30 PM	Room 223/224/225/226, America's Center
WORKSHOPS		
Program Workshop: If They're Laughing, They're Listening	9:00 AM - 10:30 AM 10:45 AM - 12:15 AM	Room 261, America's Center
Entomological Edutainment and Portal to the Public	12:30 PM - 4:30 PM	Washington Lobby, America's Center
Program Workshop: ComSciCon Entomology	1:30 PM - 5:30 PM	Room 275, America's Center
SECTION SYMPOSIA		
MUVE Section Symposium: Promoting Warfighter Readiness: DoD-Funded Entomology Research and Product Development	9:00 AM - 11:00 AM	Room 121, America's Center
MUVE Section Symposium: Urban Pests and Vectors: Emerging Impacts, Sustainable Management, and Future Research	9:00 AM - 12:00 PM	Room 120, America's Center
PBT Section Symposium: Recent Trends in Pollinator Research - Understanding and Mitigating Current Stressors	9:00 AM - 12:00 PM	Room 266, America's Center
P-IE Section Symposium: Advocating for Entomology from the Air: Innovative Applications of Drone Technology in Entomological Research and Pest Management	9:00 AM - 12:00 PM	Room 242, America's Center
P-IE Section Symposium: An Advocate for Biological Control: Honoring the Career of Dick Reardon	9:00 AM - 12:00 PM	Room 265, America's Center
P-IE Section Symposium: Charles Valentine Riley: Founding Advocate for Entomology	9:00 AM - 12:00 PM	Room 240, America's Center
MUVE Section Symposium: Indoor Pests and Human Health: Advocating for Interdisciplinary Interactions	1:30 PM - 5:15 PM	Room 260, America's Center
PBT Section Symposium: Mechanisms of Chemical Adaptation to Support Pest and Pollinator Management	1:30 PM - 5:30 PM	Room 266, America's Center
PBT Section Symposium: New Insecticidal Proteins: Novel Methods for Discovery and Characterization	1:30 PM - 5:00 PM	Room 267, America's Center
P-IE Section Symposium: Advocating for Coexistence of IRM and IPM	1:30 PM - 5:30 PM	Room 242, America's Center
P-IE Section Symposium: Advocating for IPM in a Dynamic Agricultural World	1:30 PM - 5:30 PM	Room 241, America's Center
P-IE Section Symposium: Generalist Arthropod Biological Control Agents: Effective, but Are They Safe?	1:30 PM - 5:30 PM	Room 232, America's Center
P-IE Section Symposium: How to Speak for the Pollinators: Using Big Data to Manage and Conserve Pollinator Communities	1:30 PM - 5:20 PM	Room 240, America's Center
P-IE Section Symposium: Using Integrated Observational, Mechanistic, and Experimental Research Approaches to Drive Conservation Decisions: Lessons from Butterfly Species in Peril	1:30 PM - 5:30 PM	Room 262, America's Center
SysEB Section Symposium: Bugs in Technicolor: How Color Research Advocates for Entomology	1:30 PM - 5:30 PM	Room 230, America's Center

Daily Schedule by Scientific Program

MEMBER SYMPOSIA

Advocating Entomopathogens for Sustainable Agriculture	9:00 AM - 11:45 AM	Room 264, America's Center
Catching the Right Career: An Entomology Employment Expedition	9:00 AM - 11:30 AM	Room 230, America's Center
Contributions of Daniel Potter to Science, Students, and IPM	9:00 AM - 11:30 AM	Room 126, America's Center
Effects of Land Management and Disturbance on Wild Bee Communities	9:00 AM - 12:00 PM	Room 231, America's Center
Entomology Advocacy as a Conduit for Biodiversity Conservation: 7th Latin American/Hispanic Symposium	9:00 AM - 11:30 AM	Room 127, America's Center
Monitoring and Managing the Fall Armyworm, <i>Spodoptera frugiperda</i> in Africa and Asia	9:00 AM - 11:45 AM	Room 267, America's Center
Promoting Women's Research: Global Food Security	9:00 AM - 11:00 AM	Room 125, America's Center
Synthesizing Microevolution of Plant Defenses against Insects across Disciplines	9:00 AM - 12:00 PM	Room 262, America's Center
The Intersection of Industry and Research: Semiochemical Solutions for Major Agricultural Pests	9:00 AM - 12:00 PM	Room 280, America's Center
The Staphylinidae Verses: 63,000 Stanzas Long	9:00 AM - 11:00 AM	Room 130, America's Center
Emerging Topics in Honey Bee Research: Growing Needs to Communicate and Advocate for Research-Based Information	1:30 PM - 5:30 PM	Room 231, America's Center
Entomological Bycatch: Plenty to Advocate For	1:30 PM - 4:30 PM	Room 265, America's Center
Growing the Next Generation of Entomology Advocates: A Focus on Entomology Education with Middle and High School Students	1:30 PM - 5:30 PM	Room 261, America's Center
He pua no ka wēkiu: Honoring the Life and Work of Roger Vargas	1:30 PM - 4:50 PM	Room 122, America's Center
New Frontiers in the Study of Insect Vectors of Plant Pathogens	1:30 PM - 5:30 PM	Room 127, America's Center
Novel Modes of Delivering Chemicals and Control Agents to Manage Urban Pests and Vectors More Effectively	1:30 PM - 4:40 PM	Room 280, America's Center
Regulatory Entomology: Many Hands, One Mind	2:30 PM - 5:30 PM	Room 263, America's Center

ORGANIZED MEETINGS

IOBC NRS Annual Meeting: Early Career Professionals Advocating Biological Control	1:30 PM - 4:40 PM	Room 131, America's Center
Sacred Order of the Geniculate Antennae (SOGA) Weevil Workers	1:30 PM - 4:30 PM	Room 121, America's Center
WERA 1021: An Update on Biological Control Research Against Spotted-Wing Drosophila (<i>Drosophila suzukii</i>)	1:30 PM - 4:50 PM	Room 124, America's Center
International Branch Meeting	3:30 PM – 5:30 PM	Room 132, America's Center
IUSSI North American Section Business Meeting	6:00 PM - 8:00 PM	Room 124, America's Center
Korean Young Entomologists (KYE)	6:00 PM - 9:00 PM	Room 127, America's Center
North American Dipterists Society (NADS) Meeting	7:00 PM - 9:00 PM	Room 125, America's Center
Society of Overseas Nepalese Entomologists Meeting	7:00 PM - 9:00 PM	Room 126, America's Center
The Coleopterists Society General Meeting	8:00 PM - 10:00 PM	Room 130, America's Center

LUNCH AND LEARNS

How to Advocate for Your Publications	12:15 PM - 1:15 PM	Room 131, America's Center
Getting Your Foot in the Door for Section Leadership Positions	12:15 PM - 1:15 PM	Room 132, America's Center
So, You're on the Academic Job Market: Drafting Memorable Statements, Secrets from the Search Committee, and Advice from Recent Hires	12:15 PM - 1:15 PM	Room 130, America's Center

Daily Schedule by Scientific Program

10-MIN PAPERS

MUVE, Termites, Ants, and Stinging Pests	9:00 AM - 11:50 AM	Room 122, America's Center
MUVE, Veterinary and Forensic Entomology	9:00 AM - 11:10 AM	Room 132, America's Center
PBT, Bee Physiology and Health	9:00 AM - 12:00 PM	Room 274, America's Center
P-IE, Ecology, General	9:00 AM - 11:50 AM	Room 232, America's Center
P-IE, Host-Plant Resistance	9:00 AM - 10:50 AM	Room 276, America's Center
P-IE, Invasive Species	9:00 AM - 11:50 AM	Room 241, America's Center
P-IE, Novel Tools and Products	9:00 AM - 12:00 PM	Room 275, America's Center
SysEB, Diversity, Evolution and Biology of Ants	9:00 AM - 11:50 AM	Room 124, America's Center
SysEB, Evolution, Diversity and Morphology of Coleoptera	9:00 AM - 11:20 AM	Room 123, America's Center
MUVE, Vector Biology	1:30 PM - 5:10 PM	Room 120, America's Center
PBT, Genetics and Genomics	1:30 PM - 4:30 PM	Room 274, America's Center
SysEB, Pests, Invasives and Biological Control	1:30 PM - 3:30 PM	Room 126, America's Center
SysEB, Systematics, Ecology and Morphology of Lepidoptera	2:00 PM - 3:50 PM	Room 130, America's Center
SysEB, Systematics, Evolution and Diversity of Hymenoptera	3:30 PM - 5:20 PM	Room 126, America's Center
SysEB, Evolution and Diversity of Odonata and Polyneoptera	4:00 PM - 5:10 PM	Room 130, America's Center

POSTERS AND INFOGRAPHICS

Infographic: All Sections 1	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Poster: MUVE 1	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Poster: P-IE 1	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Poster: PBT 1	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Poster: SysEB 1	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center

VIRTUAL POSTERS AND VIRTUAL INFOGRAPHICS

Virtual Infographics: All Sections	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center
Virtual Posters: All Sections 1	9:00 AM - 6:30 PM	Exhibit Hall 1 & 2, America's Center

WEDNESDAY, NOVEMBER 20

SESSION

TIME

LOCATION

PLENARIES

Closing Plenary Session	8:00 AM - 9:00 AM	America's Ballroom, America's Center
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PROGRAM SYMPOSIA

Working with the Fourth Estate: Building Bridges between Science and the Media	9:00 AM - 12:20 PM	Room 240, America's Center
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WORKSHOPS

ARM Software Training for the Industry	8:00 AM - 5:00 PM	Room 262, America's Center
Cultivating an Inclusive Environment: Recognizing and Responding to Implicit Bias	9:00 AM - 12:00 PM	Room 223/224/225/226, America's Center
Using Generalist Arthropod Biological Control Agents: Ensuring Effectiveness and Safety	9:00 AM - 4:00 PM	Room 261, America's Center

SECTION SYMPOSIA

MUVE Section Symposium: Emerging and Neglected Infectious Diseases: Innovative Vector Research	9:00 AM - 11:50 AM	Room 120, America's Center
MUVE Section Symposium: Vectors, Hosts and Pathogens: Advocating Cross-System Dialog and Research in Entomology	9:00 AM - 12:00 PM	Room 121, America's Center

Daily Schedule by Scientific Program

P-IE Section Symposium: Advocating for Entomological Solutions to the Grand Challenge of Global Food Security in the 21st Century	9:00 AM - 11:30 AM	Room 231, America's Center
P-IE Section Symposium: Transmission Ecology of Vector-borne Phytopathogens	9:00 AM - 12:00 PM	Room 263, America's Center
SysEB Section Symposium: 20 Years of Biological Survey in the Southern Appalachians: An Update on the Smokies All Taxa Biodiversity Inventory (ATBI)	9:00 AM - 11:45 AM	Room 127, America's Center
PBT Section Symposium: Cross-Pollination across Sectors: A Forum on Pollinator Health & Safety	1:30 PM - 5:30 PM	Room 266, America's Center
PBT Section Symposium: From Fat to Fact: Recent Insights on Insect Lipid Metabolism	1:30 PM - 5:30 PM	Room 267, America's Center
P-IE Section Symposium: Advocating for Endangered Insect Species - Policy, Science, Tools, and Practical Considerations	1:30 PM - 5:15 PM	Room 231, America's Center
P-IE Section Symposium: Invasion of the Spotted Lanternfly, <i>Lycorma delicatula</i> , in North America	1:30 PM - 5:30 PM	Room 263, America's Center
P-IE Section Symposium: The Larry Larson Symposium: Fall Armyworm, <i>Spodoptera frugiperda</i> (J.E. Smith), Invasion in Africa and Asia: A Cooperative Effort to Design Integrated Pest Management Programs	1:30 PM - 5:00 PM	Room 265, America's Center

MEMBER SYMPOSIA

21st Century Outreach: Innovative and Inclusive Outreach and Extension	9:00 AM - 11:00 AM	Room 260, America's Center
"A Microbe, an Herbivore, and a Plant Walk into a Field..." Microbes in Plant-Herbivore Interactions	9:00 AM - 12:00 PM	Room 267, America's Center
Analyzing Insect Development: Where Do We Stand? Expansions and Limitations in the Field of Forensic Entomology	9:00 AM - 11:00 AM	Room 266, America's Center
Applications of Molecular Ecology and Ecological Genomics to Agriculture and Pest Management	9:00 AM - 12:00 PM	Room 276, America's Center
Cuticular Hydrocarbons in Insect Communication and Physiology	9:00 AM - 12:00 PM	Room 275, America's Center
Recent Advances in the Study of Neuropterida	9:00 AM - 11:10 AM	Room 122, America's Center
Systematics and Diversity of the Tenebrionoidea	9:00 AM - 12:00 PM	Room 125, America's Center
Advances in Hemipteran Biology and Control	1:30 PM - 5:30 PM	Room 132, America's Center
Advocate with Your Pen (or Keyboard): Writing about Entomology for All Audiences	1:30 PM - 5:20 PM	Room 241, America's Center
Advocating for Entomology through Societal Impacts: Maintaining the Relevance and Visibility of Entomology in a Changing World	1:30 PM - 5:30 PM	Room 122, America's Center
Advocating for Insects as Food and Feed	1:30 PM - 5:30 PM	Room 242, America's Center
Finding Common Ground: Non-chemical Pest-Management to Protect Organic and Conventional Crops	1:30 PM - 5:10 PM	Room 264, America's Center
Next-Gen Scientists: Mentorship and Teaching Strategies to Advocate for Undergraduate Entomology Education	1:30 PM - 5:30 PM	Room 260, America's Center
Population Genetics and Pest Control: Advocating a Leading Role for Entomologists	1:30 PM - 4:40 PM	Room 280, America's Center
Recent Approaches to Studying Invertebrate Responses to Rapid Environmental Change	1:30 PM - 4:30 PM	Room 125, America's Center
Recent Innovations in Post-Harvest Entomology: Improving Food Security in an Era of Globalized Agriculture	1:30 PM - 5:30 PM	Room 123, America's Center
Social Resilience: Understanding How Environmental Stressors Impact Social Insects, from the Individual to the Collective Scales	1:30 PM - 4:00 PM	Room 126, America's Center
Tick Endosymbionts: Obligatory, Facultative, or Idiosyncratic?	1:30 PM - 4:10 PM	Room 120, America's Center
Why and How to Advocate for the Science of Insect Control	1:30 PM - 5:00 PM	Room 232, America's Center

Daily Schedule by Scientific Program

LUNCH AND LEARNS

A Beginner's Introduction to 3D Printing for Entomologists	12:15 PM - 1:15 PM	Room 131, America's Center
What's Your Story? Tips and Tricks for Telling Compelling Entomology	12:15 PM - 1:15 PM	Room 130, America's Center

10-MIN PAPERS

MUVE, Bed Bugs and Cockroaches	9:00 AM - 10:50 AM	Room 130, America's Center
MUVE, Outreach, Urban Insect Control, and Insects as Food	9:00 AM - 10:30 AM	Room 131, America's Center
MUVE, Vector Control	9:00 AM - 11:30 AM	Room 123, America's Center
PBT, Microbe Interactions and Chemical Ecology	9:00 AM - 10:40 AM	Room 274, America's Center
P-IE, IPM, Field Crops 1	9:00 AM - 12:00 PM	Room 264, America's Center
P-IE, IPM, Horticulture 1	9:00 AM - 12:10 PM	Room 232, America's Center
P-IE, Resistance Management	9:00 AM - 12:20 PM	Room 230, America's Center
P-IE, Vectors of Plant Disease	9:00 AM - 10:30 AM	Room 265, America's Center
SysEB, Evolution, Behavior, Ecology, and Genetics	9:00 AM - 11:10 AM	Room 126, America's Center
SysEB, Systematics, Genetics and Morphology of Bees	9:00 AM - 11:40 AM	Room 124, America's Center
PBT, Molecular and Biological Control	1:30 PM - 5:00 PM	Room 274, America's Center
P-IE, Transgenic Crops	1:30 PM - 2:40 PM	Room 230, America's Center

POSTERS AND INFOGRAPHICS

Infographic: All Sections 2	9:00 AM - 2:00 PM	Exhibit Hall 1 & 2, America's Center
Poster: MUVE 2	9:00 AM - 2:00 PM	Exhibit Hall 1 & 2, America's Center
Poster: P-IE 2	9:00 AM - 2:00 PM	Exhibit Hall 1 & 2, America's Center
Poster: PBT 2	9:00 AM - 2:00 PM	Exhibit Hall 1 & 2, America's Center
Poster: SysEB 2	9:00 AM - 2:00 PM	Exhibit Hall 1 & 2, America's Center

VIRTUAL POSTERS AND VIRTUAL INFOGRAPHICS

Virtual Posters: All Sections 2	9:00 AM - 2:00 PM	Exhibit Hall 1 & 2, America's Center
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Oral Presentations

SUNDAY, NOVEMBER 17, 2019 • MORNING

Program Symposium: Marketing Entomology in the 21st Century: Delivering Knowledge, Changing Attitudes, and Encouraging Action

Room 240 (America's Center)

Moderators and Organizers: David Onstad and Keri Carstens
Corteva Agriscience, Johnston, IA

8:00 **0001** It's not about the science: Learning how to advocate for entomology. **Keri Carstens** (keri.carstens@corteva.com) and David Onstad, Corteva Agriscience, Johnston, IA

8:15 **0002** Strengthening early interest in entomology: Developing systems of support for elementary science educators **Sara Nelson** (sdnelson@iastate.edu), Iowa State Univ., Ames, IA

8:30 **0003** Spreading the bug love: How zoos and museums demonstrate arthropod appreciation through informal education and exhibitory. **Catherine Bartlett** (cbartlett@desertmuseum.org)¹ and Tad Yankoski², ¹Arizona-Sonora Desert Museum, Tucson, AZ, ²Sophia M. Sachs Butterfly House, Chesterfield, MO

8:45 **0004** The fate of biological education in a world without departments of entomology. **Allan Felsot** (afelsot@tricity.wsu.edu), Washington State Univ., Richland, WA

9:00 **0005** ESA Science Policy Fellows: So easy an entomologist can do it. **Erin Cadwalader** (erin@lewis-burke.com) and Chris Stelzig², ¹Lewis-Burke Associates, Washington, DC, ²Entomological Society of America, Annapolis, MD

9:15 **0006** ESA science policy field tours: Boots on the ground for science advocacy. **Rayda K. Krell** (krellr@wcsu.edu)¹, Melissa Siebert², Luis Gomez³, Julie Shapiro⁴, Tom Anderson⁵ and Greg Krawczyk⁶, ¹Western Connecticut State Univ., Danbury, CT, ²Corteva Agriscience, Greenville, MS, ³Corteva Agriscience, Indianapolis, IN, ⁴Keystone Center, Keystone, CO, ⁵Anderson IPM Solutions, Clayton, NC, ⁶Pennsylvania State Univ., Biglerville, PA

9:30 Break

9:45 **0007** Citizen science and conservation takes flight butterflies. **Kathleen Prudic** (kprudic@email.arizona.edu)¹, Maxime Larrivée², Kent McFarland³, Gregg Treinish⁴ and Michelle Toshack⁵, ¹Univ. of Arizona, Tucson, AZ, ²Montreal Insectarium Space for Life, Montreal, QC, Canada, ³Vermont Center for Ecostudies, Norwich, VT, ⁴Adventure Scientists, Bozeman, MT

10:00 **0008** Advocating for augmentation biological control in IPM. Norman Leppla¹, **Lynn M. LeBeck** (lebeckan@comcast.net)² and Richard Ward³, ¹Univ. of Florida, Gainesville, FL, ²Association of Natural Biocontrol Producers, Clovis, CA, ³Benevolent Insectary, Inc, Guelph, ON, Canada

10:15 **0009** Economics of IPM: The data needed to influence policy debates. **David Onstad** (david.onstad@corteva.com), Corteva Agriscience, Johnston, IA

10:30 **0010** Marketing basics. **Sekar Raju** (sraju@iastate.edu), Iowa State Univ., Ames, IA

10:45 Panel discussion

Program Workshop: From Instars to Adults: Implementing Outreach Activities Across Different Education Levels and Audiences

Room 261 (America's Center)

Moderators and Organizers: Lauren Weidner¹, John Cambridge², Adrienne Brundage³, and Royce Cumming⁴, ¹Arizona State Univ., Glendale, AZ, ²Philadelphia Insectarium and Butterfly Pavilion, Philadelphia, PA, ³Texas A&M Univ., College Station, TX, ⁴American Museum of Natural History, City Univ. New York, King City, CA

8:00	Introductory remarks
8:05	Panelist #1 – 3
9:35	Break
9:50	Panelist #4 – 6
11:20	Q&A and individualized instruction
12:00	Concluding remarks

MUVE Section Symposium: Can We Really Eliminate Mosquito-Borne Disease in 21st Century?

Room 120 (America's Center)

Moderator and Organizer: Byron Reid, Bayer Crop Science,
Research Triangle Park, NC

8:00 **0011** Why we should aspire to eliminate mosquito-borne diseases in the 21st Century. **Helen Jamet** (helen.jamet@gatesfoundation.org), Bill and Melinda Gates Foundation, Seattle, WA

8:15 **0012** The value of public-private partnerships in discovering new solutions in vector control. **Nick Hamon** (nick.hamon@ivcc.com), Innovative Vector Control Consortium, Liverpool, United Kingdom

8:30 **0013** Wolbachia-based sterile insect technique in mosquitoes. **Zhiyong Xi** (xizy@msu.edu), Michigan State Univ., East Lansing, MI

8:45 **0014** Oxitec's Friendly™ mosquito and "self-limiting" gene modification. **Kevin Gorman** (kevin.gorman@oxitec.com) and Grey Frandsen, Oxitec Limited, Abingdon, United Kingdom

9:00 **0015** Combination strategies to preserve limited chemical modes of action in insecticide resistance management. **Sebastian Horstmann** (sebastian.horstmann@bayer.com), Bayer Crop Science, Monheim am Rhein, Germany

9:15 **0016** Spatial repellency as an emergent technology / use pattern in vector control programs. **John Grieco** (jgrieco@nd.edu) and Nicole L. Achee, Univ. of Notre Dame, South Bend, IN

9:30 Break

9:45 **0017** Building connected mosquito monitors to improve outcomes in vector control programs. **Michael Reddy** (michael.reddy@microsoft.com), Microsoft Research, Redmond, WA

10:00 **0018** How the donor community is driving innovation and accountability in vector control programs. Rick Steketee and **Jenny Carlson** (jcarlson@usaid.gov), US Agency for International Development, Arlington, VA

Oral Presentations

10:15 **0019** Defining the role of social enterprise in malaria elimination. **Sherwin Charles** (sherwin.charles@sonhossocialcapital.com), Goodbye Malaria, Johannesburg, South Africa

10:30 **0020** Empowering local communities to become part of the solution in vector control. **Fredros Okumu** (fredros@ihi.or.tz), Ifakara Health Institute, Dar es Salaam, Tanzania

10:45 **0021** Presentation withdrawn

11:00 **0022** Let's not forget the tick-borne diseases in our own backyards! **C. Ben Beard** (cbb0@cdc.gov), Centers for Disease Control and Prevention, Fort Collins, CO

PBT Section Symposium: Insecticidal RNAi: From Targets to Field Applications

Room 274 (America's Center)

Moderators and Organizers: William Moar¹, Swati Mishra², Ana Vélez³, and June-Sun "Sunny" Yoon⁴, ¹Bayer Crop Science, Chesterfield, MO, ²Univ. of Tennessee, Knoxville, TN, ³Univ. of Nebraska, Lincoln, NE, ⁴Cornell Univ., Ithaca, NY

8:00 Welcoming remarks

8:05 **0023** Achievements and prospects in arthropod environmental RNAi. **Gregory Heck** (gregory.heck@bayer.com), Bayer Crop Science, Chesterfield, MO

8:35 **0024** New developments in controlling flea beetles with dsRNA-based insecticides. **Steve Whyard** (steve.whyard@umanitoba.ca), Carlos Cruz, Arfar Khan and Aditi Singh, Univ. of Manitoba, Winnipeg, MB, Canada

8:50 **0025** Biorational RNAi applications for control of disease vector mosquitoes. **Molly Scheel** (mscheel@iu.edu), Univ. of Notre Dame, South Bend, IN

9:05 **0026** Lessons from Lygus: Matching RNAi strategies to subjects. **Margaret Allen** (meg.allen@ars.usda.gov), USDA - ARS, Stoneville, MS

9:20 **0027** Protocols for the high throughput RNAi in two-spotted spider mite, *Tetranychus urticae*. **Miodrag Grbic** (mgrbic@uwo.ca)¹, Nicolas Bensoussan¹, Sameer Dixit¹, Takeshi Suzuki², Maria Nunez³, Vladimir Zhurov¹ and Vojislava Grbic¹, ¹Univ. of Western Ontario, London, ON, Canada, ²Tokyo Univ. of Agriculture and Technology, Tokyo, Japan, ³Centro de Citricultura Sylvio Moreira, São Paulo, Brazil

9:35 Break

9:50 **0028** AgroSpheres enhanced RNA interference. **Ameer Shakeel** (ameer@agrospheres.com) and Payam Pourtaheri, Agrospheres, Inc, Charlottesville, VA

10:05 **0029** Chemically modified dsRNA for crop protection. **Juan Arhancet** (juan.arhancet@nanosur.com)¹, Sreevishnu Cheerla², Karl-Heinz Kogel³, Yulia Korshunova⁴, David Rozem⁵ and Grace Arhancet¹, ¹NanoSUR LLC, Miami, FL, ²Alkem Laboratories, Fenton, MO, ³Justus-Liebig-Univ., Gießen, Germany, ⁴LabMole LLC, St. Louis, MO, ⁵Empirico Inc, Madison, WI

10:20 **0030** The design and production of programmable protein-coated RNAi nanoparticles for agriculture. **Todd Hauser** (thauser@trilliumag.com) and Paul Olivier, Trillium Agriculture, Seattle, WA

10:35 **0031** Advances toward commercialization of RNA-based foliar bio-insecticides. **Ken Narva** (knarva@greenlightbio.com), GreenLight Biosciences, Durham, NC

10:50 **0032** Development of an RNAi-based Varroa destructor control product. **Alex Inberg** (alex.inberg@bayer.com)¹ and Jim Masucci², ¹Bayer Crop Science, Chesterfield, MO, ²Bayer Crop Science, St. Louis, MO

11:05 **0033** Considerations for ecological testing and assessment of dsRNA agricultural products. **Joshua Fischer** (joshua.fischer@bayer.com), Bayer Crop Science, Chesterfield, MO

11:20 **0034** Regulatory considerations for the commercialization of new insecticidal technologies. **Eric Bohnenblust** (bohnenblust.eric@epa.gov), Amanda Pierce, Alan Reynolds and Kara Welch, US Environmental Protection Agency, Washington, DC

11:35 Concluding remarks

PBT Section Symposium: Novel Applications and Risk Management of Genetic Technologies for Pest Management

Room 275 (America's Center)

Moderators and Organizers: Nicholas Teets and Justin Bredlau, Univ. of Kentucky, Lexington, KY

8:00 **0035** Polycystronic expression systems for invasive insect control. Jonas Schwirz¹, Ying Yan², Zdenek Franta¹ and **Marc Schetelig** (marc.schetelig@agrar.uni-giessen.de)^{1,2}, ¹Fraunhofer Institute for Molecular Biology and Applied Ecology, Gießen, Germany, ²Justus-Liebig-Univ., Gießen, Germany

8:15 **0036** Novel conditional sex transformation systems in the insect pest *Lucilia cuprina*. **Megan Williamson** (mewill19@ncsu.edu)¹, Ying Yan² and Max Scott¹, ¹North Carolina State Univ., Raleigh, NC, ²Justus-Liebig-Univ., Gießen, Germany

8:30 **0037** Potential for resistance to conditionally lethal transgenes used for Sterile Insect Technique. **Justin Bredlau** (bredlau@uky.edu), Fernan Perez and Nicholas Teets, Univ. of Kentucky, Lexington, KY

8:45 **0038** Medea: A natural gene-drive experiment. **Nicole Gutzmann** (negutzma@ncsu.edu), Nathaniel Grubbs and Marcé Lorenzen, North Carolina State Univ., Raleigh, NC

9:00 **0039** Designing a temporary gene drive. Josef Zapletal, Neba Najmitabrizi, Madhav Erraguntla, Mark Lawley, Kevin M. Myles and **Zach Adelman** (zachadel@tamu.edu), Texas A&M Univ., College Station, TX

9:15 Break

9:25 **0040** Presentation withdrawn

9:40 **0041** CRISPR/Cas9-mediated gene editing in *Aedes aegypti*: Development of methods to induce complete knockout in one generation. **Guanheng Zhu** (guanhengzhu@uky.edu) and Subba Reddy Palli, Univ. of Kentucky, Lexington, KY

9:55 **0042** Exploring chemoreceptors as potential targets for western corn rootworm. **Ana Vélez** (avelezarango2@unl.edu), Mariana Sanchez, Arnubio Valencia, Joe Louis and Etsuko Moriyama, Univ. of Nebraska, Lincoln, NE

10:10 **0043** Autocidal control of mosquito vectors: Fewer females via more males. **Stephen Dobson** (sdobson@uky.edu), Univ. of Kentucky, Lexington, KY

10:25 **0044** Metagenetic environmental DNA approach detects both aquatic and terrestrial arthropods in aquatic environments. **Scott Egan** (scott.p.egan@rice.edu)¹, Jennifer Drummond¹, Pedro Brandão Dias F. Pinto¹ and Eric Larson², ¹Rice Univ., Houston, TX, ²Univ. of Illinois, Champaign, IL

Oral Presentations

10:40 **SP0045** Transgenic fungus collapses mosquito population in Burkina Faso. Brian Lovett¹, Etienne Bilgo², Abdoulaye Diabate² and **Raymond J. St. Leger** (stleger@umd.edu)¹, ¹Univ. of Maryland, College Park, MD, ²Institut de Recherche en Sciences de la Santé, Bobo-Dioulasso, Burkina Faso

10:50 **SP0046** Ecological risk assessment for MON 88702 cotton expressing a modified Cry51Aa2 protein with targeted activity against certain sucking insect pests. **Lieselot Bertho** (lieselot.bertho@bayer.com), Christopher Brown, Peter Asimwe, Jianguo Tan, Jennifer Fridley, Geoffrey Mueller, Collin Preftakes, Aqeel Ahmad, Luis Burzio, Graham P. Head, Pamela Bachman and Steven Levine, Bayer Crop Science, Chesterfield, MO

PBT Section Symposium: Odorant Reception and Perception in Mosquitoes and Flies

Room 267 (America's Center)

Moderators and Organizers: John Carlson¹ and Walter Leal², ¹Yale Univ., New Haven, CT, ²Univ. of California, Davis, CA

8:00 Introductory remarks

8:05 **0047** Chemosensory perception in *Drosophila*. **John Carlson** (john.carlson@yale.edu), Yale Univ., New Haven, CT

8:20 **0048** Chemosensory mechanisms in the Asian tiger mosquito, *Aedes albopictus*. **R. Jason Pitts** (jason_pitts@baylor.edu), Baylor Univ., Waco, TX

8:35 **0049** Rapid evolution of chemical communication signals in *Drosophila*. **Joanne Yew** (jyew@hawaii.edu), Univ. of Hawai'i, Honolulu, HI

8:50 **0050** Modulation of antennal chemosensory genes throughout the first gonotrophic cycle in *Aedes aegypti*. **Sharon Hill** (sharon.hill@slu.se), Swedish Univ. of Agricultural Sciences, Alnarp, Sweden

9:05 **0051** Molecular mechanisms underlying the signaling switch by *Drosophila* odorant receptors. **Donggen Luo** (dgluo@pku.edu.cn), Peking Univ., Beijing, China

9:20 **0052** Molecular and neural insights into the evolution of mosquito preference for human odor. **Carolyn McBride** (csm7@princeton.edu), Princeton Univ., Princeton, NJ

9:35 Break

9:50 **0053** Representations of fruit odors in the peripheral olfactory system of *Drosophila suzukii*: Olfactory 'fruitprints'. **Wynand Van der Goes van Naters** (vandergoesvannatersw@cardiff.ac.uk), Cardiff Univ., Cardiff, United Kingdom

10:05 **0054** Olfactory system responses to insect repellents in transgenic *Anopheles* mosquitoes. Ali Afify¹, Olena Riabina², Chloé Lahondère³ and **Christopher Potter** (cpotter@jhmi.edu)¹, ¹Johns Hopkins Univ. School of Medicine, Baltimore, MD, ²Durham Univ., Durham, United Kingdom, ³Virginia Polytechnic Institute and State Univ., Blacksburg, VA

10:20 **0055** Volatile world of olfactory signals and reception in *Drosophila*. **Zainulabeuddin Syed** (zainulabeuddin.syed@uky.edu), Univ. of Kentucky, Lexington, KY

10:35 **0056** Lateral inhibition in the antennal lobe of *Aedes aegypti* controls nectar-seeking behavior. **Jeff Riffell** (jriffell@uw.edu), Univ. of Washington, Seattle, WA

10:50 **0057** Presentation withdrawn

11:05 **0058** Reception of odorants, DEET and carbon dioxide, in *Culex* mosquitoes. **Walter Leal** (wsleal@ucdavis.edu), Univ. of California, Davis, CA

11:20 Discussion

P-IE Section Symposium: Advocating for Forest Entomology through Teaching and Extension

Room 230 (America's Center)

Moderators and Organizers: Kayla I. Perry¹, Rachel Arango² and Jessica Hartshorn³, ¹The Ohio State Univ., Columbus, OH, ²USDA - Forest Service, Madison, WI, ³Clemson Univ., Clemson, SC

8:00 Introductory remarks

8:05 **0059** Bark Beetle Academy. **Jiri Hulcr** (hulcr@ufl.edu), Univ. of Florida, Gainesville, FL

8:20 **0060** Distance education format of teaching forest entomology. **Rolando Descalzo** (rolando.descalzo@ubc.ca), The Univ. of British Columbia, Vancouver, BC, Canada

8:35 **0061** Beyond the REU: Rethinking undergraduate research in forest entomology. **Jessica Hartshorn** (jhartsh@clemson.edu), Clemson Univ., Clemson, SC

8:50 **0062** Click! Post! Like! Using social media to promote forest entomology. **David Coyle** (dc Doyle@sref.info), Clemson Univ., Clemson, SC

9:05 **0063** All eyes on trees: Maximizing materials and training to create forest health experts everywhere. **Kelly Oten** (kelly.oten@ncagr.gov)¹ and Ryan Blaedow², ¹North Carolina Forest Service, Raleigh, NC, ²USDA - Forest Service, Asheville, NC

9:20 Panel discussion

Member Symposium: Advocate Entomology without the Jargon

Room 127 (America's Center)

Moderators and Organizers: Brian Lovett¹ and Esther Ngumbi², ¹Univ. of Maryland, College Park, MD, ²Univ. of Illinois, Champaign, IL

8:00 **0064** When does jargon rear its ugly head? **Brian Lovett** (lovettbr@umd.edu), Univ. of Maryland, College Park, MD

8:15 **0065** Switching the code: Treating jargon like a foreign language. **Nathaniel Grubbs** (npgrubbs@ncsu.edu), North Carolina State Univ., Raleigh, NC

8:30 **0066** Make your research resonate: Using storytelling to engage your audience. **Marie McNeely** (mariemcneely@peoplebehindthescience.com), People Behind the Science, St. Louis, MO

8:45 **0067** Demographics and scientific communication – Why one size doesn't fit all. **Michael J. Raupp** (mraupp@umd.edu) and Brian Lovett, Univ. of Maryland, College Park, MD

9:15 **0068** Applying strategies from the field of communication to entomology outreach. **Isa Betancourt** (isb24@drexel.edu), The Academy of Natural Sciences of Drexel Univ., Philadelphia, PA

9:45 **0069** Beyond scientific journals: Writing impact-full opinion pieces to disseminate research findings. **Esther Ngumbi** (enn@illinois.edu), Univ. of Illinois, Champaign, IL

10:00 Round table discussion

Oral Presentations

Member Symposium: Advocate for All Entomologists! Insect Scientist Stories from Beyond Academia

Room 260 (America's Center)

Moderators and Organizers: Lindsay Iglesias¹ and Ryan Gott², ¹Cornell Univ., Geneva, NY, ²Phipps Conservatory and Botanical Gardens, Pittsburgh, PA

8:00 Welcoming remarks

8:05 **0070** Your PhD is a Swiss army knife: How to identify your transferable skills. **Gwen Pearson** (gpearso@purdue.edu), Purdue Univ., West Lafayette, IN

8:35 **0071** Adventures in extension: The life of a county-based entomologist. **Jonathan Larson** (jonathan.larson@unl.edu)¹ and Jody Green², ¹Univ. of Nebraska, Omaha, NE, ²Univ. of Nebraska, Lincoln, NE

8:50 **0072** Advocate for specialty crops: The role of IR-4 in pest management. **Janine Spies** (jrazze@ufl.edu), Univ. of Florida, Gainesville, FL

9:05 **0073** Protecting our protectors. **Omotola Olaniyi** (omotola.olaniyi@ars.usda.gov), Jodi A. White-McLean and Leroy Whilby, US Army Reserves, Gainesville, FL

9:20 Career Fair poster session

SD0074 Growing bugs for allergy drugs: Entomology in pharmaceutical research. **Amanda Buchanan** (a.lynnbuchanan@gmail.com), ALK Source Materials, Inc, Post Falls, ID

SD0075 Are you a self starter who likes teaching? Consider extension! **Peter Coffey** (plcoffey@umd.edu), Univ. of Maryland, Westminster, MD

SD0076 Extension educators in entomology: We may not fit in, but we certainly belong. **Jody Green** (jgreen17@unl.edu)¹ and Jonathan Larson², ¹Univ. of Nebraska, Lincoln, NE, ²Univ. of Nebraska, Omaha, NE

SD0077 How working with extension prepared me for a career in industry. **Alix Whitener** (alix.whitener@fmc.com), FMC Agricultural Solutions, Malaga, WA

SD0078 Tales of an insect scientist: A day in the life at a semiochemical company. **Danielle Kirkpatrick** (dkirkpatrick@trece.com), Trece, Inc., Adair, OK

SD0079 Entomologists and conservation districts: Addressing local needs through broad perspectives. **Ariel Rivers** (arielrivers@yahoo.com), National Association of Conservation Districts, Livermore, CA

SD0080 Interconnectedness: Ento-preneurship both online and on tour in Ecuador. **Nancy Miorelli** (miorelln@gmail.com), SciBugs, Quito, Ecuador

9:50 **0081** Entomological careers at botanical gardens and other non-profit institutions. **Ryan Gott** (ryan.c.gott@gmail.com), Phipps Conservatory and Botanical Gardens, Pittsburgh, PA

10:05 **0082** Out in the field: The joys and challenges of a career in regulatory entomology. **Morgan Byron** (morgan.byron@freshfromflorida.com), Florida Dept. of Agriculture and Consumer Services, Gainesville, FL

10:20 **0083** From medical entomologist to edible insect farming. **Chrysanthus Tanga** (ctanga@icipe.org), International Centre of Insect Physiology and Ecology (ICIPE), Nairobi, Kenya

10:35 **0084** The story of IPM Laboratories. **Carol S. Glenister** (carolg@ipmlabs.com), IPM Laboratories, Inc, Locke, NY

10:50 **0085** IPM in practice: Day-to-day interactions between crop consultants and growers. **Christopher Crockett** (crockettcd@ufl.edu), Highland Precision Ag, Lake Wales, FL

11:05 Concluding remarks

Member Symposium: Advocate Sharing: The Science of Unpublished Results in Entomology

Room 123 (America's Center)

Moderator and Organizer: Leslie Rault, Univ. of Nebraska, Lincoln, NE

8:00 Welcoming remarks

8:05 **0086** The not so peachy side of research in southeastern fruit orchards. **Brett Blaauw** (bblaauw@uga.edu) and Tzu-Chin Liu, Univ. of Georgia, Athens, GA

8:20 **0087** Over half of livestock clinical data goes unpublished - working the bugs out of sharing the unpublisable. **Georgina Bingham** (gvb@vestergaard.com)¹, Jerome Hogsette² and David Taylor³, ¹Vestergaard S. A., Lausanne, Switzerland, ²USDA - ARS, Gainesville, FL, ³USDA - ARS, Lincoln, NE

8:35 **0088** Evaluating short-term efficacy and movement of *Trogoderma granarium* larvae towards a food bait after exposure to long-lasting insecticide-treated netting. **Deanna Scheff** (deanna.scheff@ars.usda.gov)¹, Michael Domingue², Frank Arthur¹ and Scott W. Myers², ¹USDA - ARS, Manhattan, KS, ²USDA - APHIS, Buzzards Bay, MA

8:50 **0089** When beetles prove uncooperative: The behavioral response of the red flour beetle, *Tribolium castaneum* (Coleoptera: Tenebrionidae) to attractive and repellent compounds that are neither. **Hannah Quellhorst** (hquellho@ksu.edu)¹, Chloe Albin¹, James Campbell², Fred Eller³ and William Morrison², ¹Kansas State Univ., Manhattan, KS, ²USDA - ARS, Manhattan, KS, ³USDA - ARS, Peoria, IL

9:05 Break

9:20 **0090** Experimental surprises in the investigation of ABC transporter-mediated pyrethroid detoxification in *Aedes aegypti*. **Leslie Rault** (lrault2@unl.edu), Ellis Johnson, Scott O'Neal and Troy Anderson, Univ. of Nebraska, Lincoln, NE

9:35 **0091** Unexpected repellent cross resistance in a pyrethroid-resistant strain of *Aedes aegypti*. **Liu Yang** (lyang123@ufl.edu)¹, Shiyao Jiang¹, Edmund Norris¹, Uli Bernier², Kenneth J. Linthicum² and Jeffrey Bloomquist¹, ¹Univ. of Florida, Gainesville, FL, ²USDA - ARS, Gainesville, FL

9:50 **0092** Turning negative results into positive impacts. **Blair Siegfried** (bsiegfried1@ufl.edu), Univ. of Florida, Gainesville, FL

10:05 Discussion

10:35 Concluding remarks

10:40 Poster session

SD0093 The bottom-up approach to host-plant resistance: Trying to find the resistance needle in a susceptibility haystack. **Kaitlin Chapman** (karmit.chapman@gmail.com), Univ. of Nebraska, Lincoln, NE

Oral Presentations

9:45 **0115** The evolution and genomic basis of beetle diversity. **Duane McKenna** (dmckenna@memphis.edu)¹, Erin Scully² and Seungwan Shin¹, ¹Univ. of Memphis, Memphis, TN, ²USDA - ARS, Manhattan, KS

10:00 **0116** Data mining for the prioritization of American insecta genomes. **David Molik** (david.c.molik.1@nd.edu)¹, Stephen Richards² and Michael Pfrender¹, ¹Univ. of Notre Dame, South Bend, IN, ²Univ. of California, Davis, CA

10:15 Break

10:30 **0117** The Darwin Tree of Life Project: Ambitions for insect genomics. **Mara Lawniczak** (mara.lawniczak@sanger.ac.uk)¹, Ian Barnes², Gavin Broad², Peter Holland³ and Owen Lewis³, ¹Sanger Institute, Cambridge, United Kingdom, ²Natural History Museum, London, United Kingdom, ³Univ. of Oxford, Oxford, United Kingdom

10:45 **0118** The Ag100Pest Initiative: USDA - ARS's contribution to the Earth BioGenome Project. **Anna Childers** (anna.childers@ars.usda.gov)¹, Brad Coates², Scott Geib³, Monica Poelchau¹, Christopher Childers¹, Brian Scheffler⁴ and Kevin Hackett¹, ¹USDA - ARS, Beltsville, MD, ²USDA - ARS, Ames, IA, ³USDA - ARS, Hilo, HI, ⁴USDA - ARS, Stoneville, MS

11:00 **0119** The Global Invertebrate Genomics Alliance (GIGA). Heather Bracken-Grissom¹, Keith A. Crandall² and **Jose Lopez** (joslo@nova.edu)³, ¹Florida International Univ., Miami, FL, ²George Washington Univ., Ashburn, VA, ³Nova Southeastern Univ., Dania Beach, FL

11:15 **0120** Beyond sequencing – Building a systems biology portal for plant pathosystems and arthropod vectors of plant diseases. **Surya Saha** (ss2489@cornell.edu)¹, Wayne Hunter² and Lukas Mueller¹, ¹Beyce Thompson Institute, Ithaca, NY, ²USDA - ARS, Fort Pierce, FL

11:30 Discussion

Member Symposium: Unabashed Advocacy of Arthropods: Living Tribute to Justin O. Schmidt

Room 125 (America's Center)

Moderators and Organizers: Theresa Pitts-Singer¹, Natalie Boyle¹ and Casey Delphia², ¹USDA - ARS, Logan, UT, ²Montana State Univ., Bozeman, MT

8:00 **0121** Justin Schmidt in the spotlight. **Theresa Pitts-Singer** (theresa.pitts-singer@ars.usda.gov) and Natalie Boyle, USDA - ARS, Logan, UT

8:15 **0122** Medical-entomological investigations in the southwest with Justin Schmidt. **Stephen Klotz** (sklotz@deptofmed.arizona.edu), Univ. of Arizona, Tucson, AZ

8:30 **0123** An overview of insect sting allergy in Europe. **Bob Jacobson** (jacobsonbob@yahoo.com), Cincinnati, OH

8:45 **0124** Health advocacy: Getting research out of dusty journals to people who can use it. **Nancy C. Hinkle** (nhinkle@uga.edu), Univ. of Georgia, Athens, GA

9:00 Break

9:10 **0125** Bee sting morphology, phylogeny and the origin of bees. **Laurence Packer** (xeromelissa@mail.com), York Univ., Toronto, ON, Canada

9:25 **0126** Not on the stinger alone – 60 years of ant chemical ecology. **Abraham Hefetz** (hefetz@post.tau.ac.il), Tel Aviv Univ., Tel Aviv, Israel; Ruppin Academic Center, Michmoret, Israel

9:55 **0127** Monitoring saguaros, running from Africanized bees and exploring the biology of native Sonoran Desert bees. **Stephen Buchmann** (buchmann.stephen@gmail.com), Univ. of Arizona, Tucson, AZ

10:10 **0128** Progress unveiling stubborn secrets that link bees' pollen preferences with larval nutrition. **James H. Cane** (jim.cane2@gmail.com), USDA – ARS (retired), Logan, UT

10:25 Break

10:35 **0129** Narrowing the gap between academic researchers and outreach in Costa Rica and beyond. **Gordon W. Frankie** (gwfrankie@berkeley.edu), Marissa Chase, Jaime Pawelek and Rollin Coville, Univ. of California, Berkeley, CA

11:05 **0130** Leveraging unusual arachnids to advance scientific knowledge and understanding. **Eileen Hebets** (ehebets2@unl.edu), Univ. of Nebraska, Lincoln, NE

11:20 **0131** Seventy years of unabashed entomological fun and dumb luck. **Justin Schmidt** (ponerine@dakotacom.net)¹ and Li Schmidt², ¹Southwestern Biological Institute, Tucson, AZ, ²SameDayFamilyMedicine.com, Tucson, AZ

Organized Meeting: Current Advances in Acarology

Room 126 (America's Center)

Moderators and Organizers: Monica Farfan¹ and Samuel Bolton², ¹Clemson Univ., Charleston, SC, ²Florida Dept. of Agriculture and Consumer Services, Gainesville, FL

8:00 Welcoming remarks

8:05 **0132** Estimating global biodiversity: The role of mites. **John Wiens** (wiensj@email.arizona.edu), Univ. of Arizona, Tucson, AZ

8:20 **0133** All mite, fine and dandy – the diagnostic of well-known biocontrol agents. **Fred Beaulieu** (frederic.beaulieu@agr.gc.ca) and Wayne Knee, Agriculture and Agri-Food Canada, Ottawa, ON, Canada

8:35 **0134** Nebraska Statewide Tick Survey Program: Overview, funding sources, and new records. **David Nielsen** (dnielse8@hotmail.com)¹, Lindsey Nielsen², Peter Iwen², Paul Fey² and Roberto Cortinas³, ¹Nebraska Dept. of Agriculture, NE, ²Univ. of Nebraska Medical Center, Omaha, NE, ³Univ. of Nebraska, Lincoln, NE

8:50 **0135** Pesticide non-target effects on phytoseiids: Summarizing decades of research. **Rebecca Schmidt-Jeffris** (rebecca.schmidt@usda.gov)¹ and Elizabeth Beers², ¹USDA - ARS, Wapato, WA, ²Washington State Univ., Wenatchee, WA

9:05 **0136** Diversity of phytoseiid mites on watermelon in South Carolina and preliminary food web structure of a frequently collected species. **Monica Farfan** (mfarfan@clemson.edu)¹ and Rebecca Schmidt-Jeffris², ¹Clemson Univ., Charleston, SC, ²USDA - ARS, Wapato, WA

9:20 **0137** Diversity and abundance of predacious mites in Citrus Under Protective Screen (CUPS). **Emilie Demand** (edemand@ufl.edu)¹, Jawwad Qureshi², Ismail Döker³ and Rhuanito Ferrarezi¹, ¹Univ. of Florida, Fort Pierce, FL, ²Univ. of Florida, Immokalee, FL, ³Çukurova Univ., Adana, Turkey

9:35 **0138** *Amblyseius swirskii* attraction to volatiles produced from roses infected with Rose Rosette Virus. **Austin Fife** (afife@ufl.edu), Mathews Paret, Gary Knox and Xavier Martini, Univ. of Florida, Quincy, FL

Oral Presentations

10:40 **0161** Biocidal activities of cypermethrin and lufenuron against *Tribolium castaneum* (Herbst). Mansoor ul Hasan¹, **Tauqir Anwar** (tauqueer26@gmail.com)¹, Mazhar Ranjha¹, Qurban Ali², Muhammad Faisal³ and Muhammad Umar Qasim², ¹Univ. of Agriculture, Faisalabad, Pakistan, ²Ayub Agricultural Research Institute, Faisalabad, Pakistan, ³Dept. of Pest Warning and Quality Control of Pesticides, Chunian, Pakistan

10:50 **0162** Impact of insect growth regulators against the eggs of *Trogoderma granarium* (Everts) and *Tribolium castaneum* (Herbst). **Qurban Ali** (qurban_ent@yahoo.com)¹, Mansoor ul Hasan¹, Hafiz Usman Shakir³, Najuf Awais Anjum¹ and Muhammad Faisal⁴, ¹Ayub Agricultural Research Institute, Faisalabad, Pakistan, ²Univ. of Agriculture, Faisalabad, Pakistan, ³Dept. of Pest Warning and Quality Control of Pesticides, Lahore, Pakistan, ⁴Dept. of Pest Warning and Quality Control of Pesticides, Chunian, Pakistan

11:00 **0163** Residual efficacy of methoxyfenozide on different grain commodities for the management of three stored product insect pests. **Muhammad Yasir** (yasiruca@gmail.com), Mansoor ul Hasan and Muhammad Sagheer, Univ. of Agriculture, Faisalabad, Pakistan

11:10 **0164** Presentation withdrawn

11:20 **0165** Studies on malaria vectors resistance intensity to deltamethrin insecticide in central Nigeria. Georgina Mwansat¹, Akwashiki Ombugadu², Mahanan Mafuya³, Pangwa Lapang¹, Cyril Nkup⁴ and **Nannim Nanyat** (nyvatnannim@gmail.com)¹, ¹Univ. of Jos, Jos, Nigeria, ²Federal Univ., Lafia, Nigeria, ³Federal College of Forestry, Jos, Nigeria, ⁴College of Arts, Science and Technology, Kurgwi, Nigeria

11:30 **0166** Nanobiosensors for tracking pesticide resistance genes in *Helicoverpa armigera* (Lepidoptera: Noctuidae) and interspecific hybrids. **Luke Tembrock** (tembrock@colostate.edu)¹, Frida Zink¹, Alicia Timm¹ and Todd Gilligan², ¹Colorado State Univ., Fort Collins, CO, ²USDA - APHIS, Fort Collins, CO

11:40 **0167** Cry toxin expression in Bt cotton hybrid seeds: Impact on the 'built-in-refuge' strategy for managing resistance in bollworms. **Murali Mohan** (entomurali@gmail.com), Univ. of Agricultural Sciences, Bangalore, India

10-min: P-IE, Biocontrol, Parasitoids and Pathogens

Room 232 (America's Center)

Moderators: Joe Kaser¹ and Camila Oliveira-Hofman², ¹USDA - ARS, Newark, DE, ²USDA - ARS, Byron, GA

8:00 **0168** Impact of Nile Blue A and Trelona bait on eastern subterranean termite (Blattodea: Rhinotermitida: Reticulitermes flavipes). **Richard Murphy** (rom0004@tigermail.auburn.edu) and Xing Ping Hu, Auburn Univ., Auburn, AL

8:10 **0169** *Trissolcus japonicus* winter survival. **David Lowenstein** (david.lowenstein@oregonstate.edu) and Nik G. Wiman, Oregon State Univ., Aurora, OR

8:20 **0170** Parasitoid release numbers and establishment of introduced *Trissolcus japonicus* in Delaware. **Joe Kaser** (joseph.kaser@ars.usda.gov), Kathleen Tatman and Kim Hoelmer, USDA - ARS, Newark, DE

8:30 **0171** Fundamental and ecological host range of *Trissolcus japonicus* in Europe. **Tim Haye** (t.haye@cabi.org)¹, Silvia Moraglio², Judith Stahl³, Sara Visentin², Tommaso Gregorio⁴ and Luciana Tavella², ¹CABI, Delémont, Switzerland, ²Univ. of Torino, Grugliasco, Italy, ³Univ. of California, Parlier, CA, ⁴Hazelnuts Company Division, Findel, Luxembourg

8:40 **0172** *Halyomorpha halys* and *Trissolcus japonicus* in New Jersey - What's next? **Pierre Girod** (pierre.girod@rutgers.edu)^{1,2} and George C. Hamilton¹, ¹Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, ²Swiss National Science Foundation, Bern, Switzerland

8:50 **0173** Reproductive traits of the North American parasitoid *Ontsira mellipes* as a novel control agent for the invasive Asian longhorned beetle. **Xingeng Wang** (xingeng.wang@ars.usda.gov)¹, Jian Duan¹ and Juli Gould², ¹USDA - ARS, Newark, DE, ²USDA - APHIS, Buzzards Bay, MA

9:00 **0174** A phenological model for predicting parasitoid-host synchrony between *Oobius agrili* and emerald ash borer throughout their current and potential range in North America. **Toby R. Petrice** (petrice@msu.edu)¹, Leah S. Bauer¹, Therese Poland¹ and Forrest Ravlin², ¹USDA - Forest Service, Lansing, MI, ²Michigan State Univ., East Lansing, MI

9:10 **0175** Induction of cold hardiness in *Spathius galinae* (Hymenoptera: Braconidae), a larval parasitoid introduced for biocontrol of emerald ash borer in North America. **Jennifer Chandler** (jchandler@umass.edu)¹, Joseph Elkinton¹ and Jian Duan², ¹Univ. of Massachusetts, Amherst, MA, ²USDA - ARS, Newark, DE

9:20 Break

9:30 **0176** North American spread of argentine cactus moth: The risks, challenges, and promises of developing a biological control program. **Mrittunjai Srivastava** (mrittunjai.srivastava@freshfromflorida.com)¹, Danielle Wolaver¹, Daniel Ammann¹, Eric Rohrig¹, Stephen Hight² and Laura Varone³, ¹Florida Dept. of Agriculture and Consumer Services, Gainesville, FL, ²USDA - ARS, Tallahassee, FL, ³Fundación para el Estudio de Especies Invasivas, Hurlingham, Argentina

9:40 **0177** The parasitoid *Fopius arisanus* in classical biological control of the oriental fruit fly in West and Central Africa. **Rachid Hanna** (rachidhanna01@gmail.com)¹, Samuel Nanga Nanga², Desire Gnavorossou³, Komi Fiaboe², Apolin Fotso Kuate², Aimé Bokonon-Ganta⁴ and Champlain Lordon-Djieto⁵, ¹Congo Basin Institute, Yaounde, Cameroon, ²International Institute of Tropical Agriculture, Yaoundé, Cameroon, ³International Institute of Tropical Agriculture, Cotonou, Benin, ⁴Univ. of Abomey Calavi, Cotonou, Benin, ⁵Univ. of Yaounde I, Yaounde, Cameroon

9:50 **0178** Impact of a cut flower intercrop on the cabbage caterpillar complex and its parasitoids. **Ana Legrand** (ana.legrand@uconn.edu), Univ. of Connecticut, Storrs, CT

10:00 **0179** Biological control of coffee berry borer, *Hypothenemus coffea* in Hawai'i. **Fazila Yousuf** (fyousuf@hawaii.edu)¹, Peter Follett² and Mark Wright³, ¹Univ. of Hawai'i, Hilo, HI, ²USDA - ARS, Hilo, HI, ³Univ. of Hawai'i, Honolulu, HI

10:10 **0180** Genetic diversity and comparative virulence against the coffee berry borer, *Hypothenemus hampei*, of *Beauveria bassiana* isolates from Hawai'i and Puerto Rico. **Louela Castrillo** (louela.castrillo@ars.usda.gov)¹, Stephen Wright¹, Sandy Galaini-Wright², Tracie Matsumoto³, Rebecca Howes¹, Michael Griggs¹ and Lisa Keith³, ¹USDA - ARS, Ithaca, NY, ²Univ. of Hawai'i, Hilo, HI, ³USDA - ARS, Hilo, HI

10:20 **0181** Entomopathogenic fungus for managing wireworms on spring wheat in Montana. **Anamika Sharma** (anamika.sharma@montana.edu)¹, Gadi V. P. Reddy¹ and Stefan Jaronski², ¹Montana State Univ., Conrad, MT, ²USDA - ARS (retired), Sidney, MT

10:30 Break

Oral Presentations

10:40 0182 *Beauveria bassiana* as a fungal endophyte in pecan seedlings. Tshimangadzo Ramakuwela¹, Justin Hatting¹, Clive Bock², Fernando E. Vega³, Lenny Wells⁴, George Mbata⁵ and **David Shapiro-Ilan** (david.shapiro@ars.usda.gov)², ¹Agricultural Research Council, Bethlehem, South Africa, ²USDA - ARS, Byron, GA, ³USDA - ARS, Beltsville, MD, ⁴Univ. of Georgia, Tifton, GA, ⁵Fort Valley State Univ., Fort Valley, GA

10:50 0183 Environmental factors affecting the viability and virulence of entomopathogenic fungi. **Shaohui Wu** (shaohui.wu@uga.edu)¹, David Shapiro-Ilan² and Michael Toews¹, ¹Univ. of Georgia, Tifton, GA, ²USDA - ARS, Byron, GA

11:00 0184 Spore acquisition and survival of the tea shot hole borer, *Euvallacea nr. fornicatus*, after exposure to entomopathogenic fungal formulated products containing *Beauveria bassiana*. Alejandra Chavez¹, **Pasco Avery** (pbavery@ufl.edu)¹, Emily Duren¹, Rita Duncan², Daniel Carrillo² and Ronald Cave¹, ¹Univ. of Florida, Fort Pierce, FL, ²Univ. of Florida, Homestead, FL

11:10 0185 Entomopathogenic fungal diversity and potential for pest control on Australian banana farms. Amy McGuire¹ and **Tobin Northfield** (tnorthfield@wsu.edu)², ¹James Cook Univ., Cairns, QLD, Australia, ²Washington State Univ., Wenatchee, WA

11:20 0186 Pheromone-mediated behavioural manipulation of entomopathogenic nematodes to improve biocontrol efficacy. **Camila Oliveira-Hofman** (camila.hofman@ars.usda.gov)¹, Fatma Kaplan², Glen Stevens³, Edwin Lewis³, Shaohui Wu⁴, Hans Alborn⁵, Abigail Perret-Gentil⁶ and David Shapiro-Ilan¹, ¹USDA - ARS, Byron, GA, ²Pheronym Inc, Gainesville, FL, ³Univ. of Idaho, Moscow, ID, ⁴Univ. of Georgia, Tifton, GA, ⁵USDA - ARS, Gainesville, FL

11:30 0187 Presentation withdrawn

11:40 0188 Improved culture media for liquid fermentation of *Metarhizium robertsii* blastospores and bioefficacy against the corn leafhopper. Natasha Iwanicki¹, Gabriel Mascarini², Sara Moreno¹, Jorgen Eilenberg³ and **Italo Delalibera** (delalibera@usp.br)¹, ¹Univ. de São Paulo, Piracicaba, Brazil, ²Embrapa Meio Ambiente, Jaguariuna, Brazil, ³Univ. of Copenhagen, Frederiksberg, Denmark

10-min: P-IE, Chemical Ecology

Room 264 (America's Center)

Moderators: Erik Wenninger¹ and Pablo Urbaneja-Bernat², ¹Univ. of Idaho, Kimberly, ID, ²Rutgers, The State Univ. of New Jersey, Chatsworth, NJ

8:00 0189 Utilizing attract-and-kill strategy to control cocoa pod borer infestation. **Aijun Zhang** (aijun.zhang@ars.usda.gov)¹ and Wouter Vanhove², ¹USDA - ARS, Beltsville, MD, ²Ghent Univ., Ghent, Belgium

8:10 0190 Optimizing attraction of sugar beet root maggot flies, *Tetanops myopaeformis* (Diptera: Ulidiidae), to aggregation pheromone lures. **Erik Wenninger** (erikw@uidaho.edu)¹ and Sanford Eigenbrode², ¹Univ. of Idaho, Kimberly, ID, ²Univ. of Idaho, Moscow, ID

8:20 0191 Absence of host-associated mating shapes application of pheromone mating disruption for swede midge, *Contarinia nasturtii* (Diptera: Cecidomyiidae). **Andrea Swan** (andrea.swan@uvm.edu), Elisabeth Hodgdon and Yolanda Chen, Univ. of Vermont, Burlington, VT

8:30 0192 Evidence of olfactory contrast in a parasitic wasp species: A behavioral perspective. **Tolulope Morawo** (tom0002@auburn.edu) and Henry Fadamiro, Auburn Univ., Auburn, AL

8:40 0193 Reproductive site selection: Evidence of an oviposition marking pheromone in a highly adaptive dipteran. **Gabriella Tait** (gabriella.tait@oregonstate.edu)¹, Kyoo Park¹, Rachele Nieri¹, Cristina Crava², Elena Clappa³, Gabriella Boyer⁴, Serhan Mermer¹, Daniel Dalton¹, Silvia Carlin³, Linda Brewer¹, Vaughn Walton¹, Gianfranco Anfora³ and Marco Valerio Rossi Stacconi¹, ¹Oregon State Univ., Corvallis, OR, ²Pavia University, Pavia, Italy, ³Fondazione Edmund Mach, San Michele all'Adige, Italy, ⁴Oregon State Univ., Hood River, OR

8:50 0194 Soil-mediated associational resistance to an herbivore due to a novel maize cropping system. **Daniel Mutyambai** (dmutyamba@yahoo.com)^{1,2}, Ethan Bass¹, Tim Luttermoser¹, Katja Poveda¹, Charles Midega³, Zeyaur Khan³ and Andre Kessler¹, ¹Cornell Univ., Ithaca, NY, ²South Eastern Kenya Univ., Kitui, Kenya, ³International Centre of Insect Physiology and Ecology (icipe), Nairobi, Kenya

9:00 0195 Cover crop legacy alters maize plant defense responses to caterpillars and pathogenic fungi. **Swayamjit Ray** (szr146@psu.edu)¹, Elizabeth Davidson-Lowe¹, Ebony Murrell² and Jared Ali¹, ¹Pennsylvania State Univ., University Park, PA, ²Univ. of Wisconsin, Madison, WI

9:10 0196 Wheat volatile analysis on susceptible and resistant lines to the orange wheat blossom midge, *Sitodiplosis mosellana* (Diptera: Cecidomyiidae). **Chaminda De Silva** **Weeraddana** (chaminda.weeraddana@umanitoba.ca)¹, Tom Ward¹, Curt McCartney², Désirée Vanderwel³, N. Kirk Hillier⁴, Tyler Wist⁵, Ian Wise¹, Sheila Wolfe² and Alejandro Costamagna¹, ¹Univ. of Manitoba, Winnipeg, MB, Canada, ²Agriculture and Agri-Food Canada, Winnipeg, MB, Canada, ³Univ. of Winnipeg, Winnipeg, MB, Canada, ⁴Acadia Univ., Wolfville, NS, Canada, ⁵Agriculture and Agri-Food Canada, Saskatoon, SK, Canada

9:20 0197 Associational effects of chemical traits among tomato plant neighbors shapes the arthropod community. **Andrea Glassmire** (glssmr33@gmail.com) and William Wetzel, Michigan State Univ., East Lansing, MI

9:30 0198 Screening plant essential oils for their ability of impairing insect immune system. Westley Peterson¹, Kyndra Chastain¹, Michael Fenske¹, Jessica Veenstra² and **Maciej A. Pszczolkowski** (mpszczolkowski@missouristate.edu)¹, ¹Missouri State Univ., Mountain Grove, MO, ²Truman State Univ., Kirksville, MO

9:40 0199 Guttation as a potential food source for insects in blueberries. **Pablo Urbaneja-Bernat** (paurbaneja@gmail.com)¹, Alejandro Tena², Joel González-Cabrera³ and Cesar Rodriguez-Saona⁴, ¹Rutgers, The State Univ. of New Jersey, Chatsworth, NJ, ²Instituto Valenciano de Investigaciones Agrarias, Moncada, Spain, ³Universitat de València, Burjassot, Spain, ⁴Rutgers, The State Univ. of New Jersey, New Brunswick, NJ

10-min: P-IE, Ecology and Climate Change

Room 265 (America's Center)

Moderators: Natasha Tigreros¹ and Brian Aukema², ¹Univ. of Arizona, Tucson, AZ, ²Univ. of Minnesota, St. Paul, MN

8:00 0200 Simulating the potential global distribution of the Japanese beetle under current climate and RCP 8.5 scenario. **Erica Kistner-Thomas** (ekistnerphd2014@gmail.com), USDA - ARS, Ames, IA

8:10 0201 How does cultivation of domesticated crops influence leaf herbivory in Mesoamerica? **Jorge Ruiz-Archo** (jruizaro@gmail.com) and Yolanda Chen, Univ. of Vermont, Burlington, VT

Oral Presentations

8:20 **0202** Evidence for a “green-to-brown” shift in arthropod community structure following plant invasion in the Mid-Atlantic. **Adam Mitchell** (mitchell.adam.b@gmail.com)¹ and Douglas W. Tallamy², ¹Terleton State Univ., Stephenville, TX, ²Univ. of Delaware, Newark, DE

8:30 **0203** Consequences of habitat fragmentation on the dispersal ability of a terrestrial beetle *Zophosis punctata*. **Natasha Tigreros** (ntm@email.arizona.edu)¹, Goggy Davidowitz¹, Giorgi Kozhoridze² and Yaron Ziv², ¹Univ. of Arizona, Tucson, AZ, ²Ben Gurion Univ. of the Negev, Beer Sheva, Israel

8:40 **0204** Unraveling the ecology and diet breadth of two highly invasive *Spodoptera* spp. **Amit Roy** (roy@fld.cz.cu.cz)¹, Peter Anderson², Mattias Larsson² and Fredrik Schlyter¹, ¹Czech Univ. of Life Sciences, Prague, Czech Republic, ²Swedish Univ. of Agricultural Sciences, Alnarp, Sweden

8:50 **0205** Life tables of apple blossom weevil (*Anthonomus pomorum* L.) on apples and pears in urbanized territories of Moscow and Tver regions, Russia. **Sergei Popov** (sergei_ya_popov@mail.ru) and Svetlana Dmitrieva, Russian Timiryazev State Agrarian Univ., Moscow, Russian Federation

9:00 **0206** A citizen science approach to evaluate how landscape context influences use of home garden habitats by native and exotic lady beetles. **Leo Taylor** (taylor.3408@osu.edu), Christopher Riley, Kayla I. Perry, Katherine Turo, Yvan Delgado de la Flor, Frances S. Sivakoff and Mary Gardiner, The Ohio State Univ., Columbus, OH

9:10 Break

9:20 **0207** Butterfly gardens as a conservation cum ecotourism venture: A case study at Peechi (Kerala, India). **George Mathew** (gmathewkfri@gmail.com), Kerala Forest Research Institute, Mavelikara, India

9:30 **0208** Validating models of phenology, diapause, and voltinism in the field. **Tyson Wepprich** (tyson.wepprich@oregonstate.edu), Fritzi Grevstad and Leonard Coop, Oregon State Univ., Corvallis, OR

9:40 **0209** Development of a second generation for the carrot weevil (*Listronotus oregonensis*) in the province of Quebec, Canada. **Annie-Ève Gagnon** (annie-eve.gagnon@canada.ca) and Gaétan Bourgeois, Agriculture and Agri-Food Canada, Saint-Jean-sur-Richelieu, QC, Canada

9:50 **0210** Impacts of varied fire exposure on herbivory loads and seedling growth in the Central Hardwoods. **Luke Dodd** (luke.dodd@eku.edu)¹ and Lynne Rieske², ¹Eastern Kentucky Univ., Richmond, KY, ²Univ. of Kentucky, Lexington, KY

10:00 **0211** Drought drives outbreak dynamics of an invasive forest insect on an exotic host: *Sirex* woodwasp in Patagonia. **Brian Aukema** (brianaukema@umn.edu)¹, M. Victoria Lantschner² and Juan Corley², ¹Univ. of Minnesota, St. Paul, MN, ²INTA - CONICET, Bariloche, Argentina

10:10 **0212** Impact of elevated salinity on a tri-trophic system: Rice, planthopper and green mirid bug. Md Rahman, Sheikh Haque and **Panna Ali** (panna_all@yahoo.com), Bangladesh Rice Research Institute, Gazipur, Bangladesh

10:20 **0213** Economic values of monarch and viceroy butterfly conservation: A case study of Kentucky residents. **Jerrod Penn** (jpenn@agcenter.lsu.edu)¹ and Wuyang Hu², ¹Louisiana State Univ., Baton Rouge, LA, ²The Ohio State Univ., Columbus, OH

10-min: P-IE, IPM, Horticulture 2

Room 263 (America's Center)

Moderators: Dakshina Seal¹ and Victor Izzo², ¹Univ. of Florida, Homestead, FL, ²Univ. of Vermont, Burlington, VT

8:00 **0214** Comparison of various statistical indices in determining distribution pattern of three species of thrips (Thysanoptera: Thripidae) in South Florida tomato fields. **Dakshina Seal** (dseal3@ufl.edu) and Rafia Khan, Univ. of Florida, Homestead, FL

8:10 **0215** Species composition and phenology of thrips infesting field tomatoes in central and western North Carolina. **Thomas Bilbo** (bilbothomas@gmail.com) and Jim Walgenbach, North Carolina State Univ., Mills River, NC

8:20 **0216** Evaluating fertilizer rates and insecticide application frequency for management of onion thrips (*Thrips tabaci*) on onion. **Karly Regan** (khr27@cornell.edu) and Brian Nault, Cornell Univ., Geneva, NY

8:30 **0217** Performance of sterilants for organic management of spotted-wing drosophila (*Drosophila suzukii*) in Georgia blueberries. **Craig Roubos** (craig.roubos@uga.edu) and Ashfaq Sial, Univ. of Georgia, Athens, GA

8:40 **0218** Spatial and temporal patterns of spinosad resistance in a California population of *Drosophila suzukii*. **Brian Gress** (bgress@ucdavis.edu), Kathlyne-Inez Soukhaseum and Frank Zalom, Univ. of California, Davis, CA

8:50 Break

9:00 **0219** Molecular tools for detecting *Drosophila suzukii* in trap samples. **Justin Renkema** (justin.renkema@canada.ca)¹, Shu Chen² and Wendy McFadden-Smith³, ¹Agriculture and Agri-Food Canada, Vineland, ON, Canada, ²Univ. of Guelph, Guelph, ON, Canada, ³Ontario Ministry of Agriculture, Food and Rural Affairs, Vineland Station, ON, Canada

9:10 **0220** Population abundance of *Aphis illinoiensis* Shimer in muscadine grapes and using biological control and reduced-risk pesticides for management of grapevine aphid. **Nupur Sarkar** (nupur.sarkar@ufl.edu) and Oscar Liburd, Univ. of Florida, Gainesville, FL

9:20 **0221** Assessing the impact of social wasps in vineyards and the use of semiochemicals for management. **Abby Lois** (anois@wisc.edu), Univ. of Wisconsin, Madison, WI

9:30 **0222** Improving vine mealybug controls through adjuvant addition in major grape growing regions of California. **Thomas Martin** (thomasmartin636@gmail.com)¹, Kent Daane², Jacob Wenger¹ and Louis Holloway³, ¹California State Univ., Fresno, CA, ²Univ. of California, Parlier, CA, ³Bayer Crop Science, Fresno, CA

9:40 **0223** Performance of selected biopesticides against major insect pests in the organic production of summer squash and southern peas in Alabama. Sonu Koirala B. K., **Franklin Quarcoo** (fquarcoo1@tuskegee.edu), Anitha Chitturi, Kokoaesse Kpombiekou-A, Desmond Mortley and Wendall McElhenney, Tuskegee Univ., Tuskegee, AL

9:50 **0224** Evaluation of neem formulation on insects of vegetables and fruit trees. **Manuel Campos** (mcampose@biosafesystems.com), BioSafe Systems, East Hartford, CT

10:00 Break

Oral Presentations

10:10 0225 The effect of variety and cover crop on twospotted spider mite, *Tetranychus urticae* Koch, on two organic strawberry farms in north-central Florida. **Elena Rhodes** (erhodes@ufl.edu), Carlene Chase, Xin Zhao and Oscar Liburd, Univ. of Florida, Gainesville, FL

10:20 0226 Commercial insecticide practices reduce natural enemies and opportunities for IPM in Midwest watermelon production. **John Yaninek** (yaninek@purdue.edu), Amanda Skidmore, Ivan Grijalva and Rick Foster, Purdue Univ., West Lafayette, IN

10:30 0227 Efficacy of synthetic insecticides against major insect pests of watermelon (*Citrullus lanatus*). **Olaadele Olaniran** (oaolaniran@lauitech.edu.ng), Olugbenga Adeleke and Fatai Alao, Ladoke Akintola Univ. of Technology, Ogbomoso, Nigeria

10:40 0228 Plant architectural complexity leads to trade-offs in plant yield and pest control with natural enemies in a garden setting. **Warren Sconiers** (wsconiers@ozarks.edu), Catherine Thompson and Kim Van Scy, Univ. of the Ozarks, Clarksville, AR

10:50 0229 Management of Allium leafminer (*Phytomyza gymnostoma*): A new invasive pest of Allium crops in North America. **Brian Nault** (ban6@cornell.edu)¹, Riley Harding¹, Lindsay Iglesias¹, Ethan Grundberg², Teresa Rusinek³, Timothy Elkner⁴, Brandon Lingbeek⁴ and Shelby J. Fleischer⁵, ¹Cornell Univ., Geneva, NY, ²Cornell Univ., Middletown, NY, ³Cornell Univ., Highland, NY, ⁴Pennsylvania State Univ., Manheim, PA, ⁵Pennsylvania State Univ., University Park, PA

11:00 0230 Our onions are crying: Pre- and post-harvest tactics for the management of leek moth, *Acrolepiopsis assectella*. **Victor Izzo** (vizzo@uvm.edu) and Scott Lewins, Univ. of Vermont, Burlington, VT

11:10 0231 Presentation withdrawn

10-min: P-IE, Pollination

Room 242 (America's Center)

Moderators: Conrad Labandeira¹ and John Wenzel², ¹Smithsonian Institution, National Museum of Natural History, Washington, DC, ²Carnegie Museum of Natural History, Rector, PA

8:00 0232 Evolutionary biology of insect pollination during the mid Mesozoic. **Conrad Labandeira** (labandec@si.edu), Smithsonian Institution, National Museum of Natural History, Washington, DC

8:10 0233 Bee foraging patterns on domesticated crops and their wild relatives. **Kristen Brochu** (kkb90@psu.edu) and Margarita López-Uribe, Pennsylvania State Univ., University Park, PA

8:20 0234 Floral resources positively impact pollinator diversity and visitation, but not successful pollination, in Australian urban food gardens. **Robert McDougall** (robert.n.mcdougall@gmail.com)¹, Paul Kristiansen² and Romina Rader², ¹Rutgers, The State Univ. of New Jersey, Bridgeton, NJ, ²Univ. of New England, Armidale, NSW, Australia

8:30 0235 Supplementing on-farm pollinator refuges with managed bees can decrease overall crop pollination services. **Gina Angelella** (ginama@vt.edu)¹, Christopher McCullough² and Megan O'Rourke², ¹Virginia Polytechnic Institute and State Univ., Painter, VA, ²Virginia Polytechnic Institute and State Univ., Blacksburg, VA

8:40 0236 Evidence for interference competition between honey bees and the endangered Hawaiian yellow-faced bee, *Hylaeus anthracinus* (Colletidae). Keilyn Ing¹ and **Christina Mogren** (cmogren@hawaii.edu)², ¹Santa Clara Univ., Santa Clara, CA, ²Univ. of Hawai'i, Honolulu, HI

8:50 0237 Potential for economic and ecological tradeoffs when managing bumble bees for crop pollination. **Heather Grab** (hlc66@cornell.edu), Aaron Iverson, Olivia Miller, Leeah Richardson, Nathaniel Flicker, Diana Obregon, Nicolas Baert, Casey Hale, Bryan N. Danforth, Scott McArt and Katja Poveda, Cornell Univ., Ithaca, NY

9:00 0238 Contrasting the foraging patterns and resource preferences of honey bees and bumble bees in a common landscape. **Johanne Brunet** (johanne.brunet@ars.usda.gov)¹ and Danny Minahan², ¹USDA - ARS, Madison, WI, ²Univ. of Wisconsin, Madison, WI

9:10 Break

9:20 0239 The effects of warming and drought on the plant-pollinator mutualism in squash (*Cucurbita pepo*). **Jess Gambel** (jgambel@ucsd.edu)¹ and David Holway², ¹Univ. of California, La Jolla, CA, ²Univ. of California, San Diego, CA

9:30 0240 Drought stress changes floral volatile emissions, and reduces nectar rewards, pollinator visitation, and seed set, in a globally grown plant. **Rachel Mallinger** (rachel.mallinger@ufl.edu)¹, Jose Franco² and Caitlin Rering³, ¹Univ. of Florida, Gainesville, FL, ²USDA - ARS, Mandan, ND, ³USDA - ARS, Gainesville, FL

9:40 0241 Cowpea (*Vigna unguiculata*) as pollinator enhancer in a vegetable production system: The effect on pollinator abundance and crop yield. **Beatrice Dingha** (bdingha@ncat.edu) and Louis Jackai, North Carolina A&T State Univ., Greensboro, NC

9:50 0242 Investigations on the impact of blueberry pollination on honey bee health, *Apis mellifera* Linnaeus. **Dean Polk** (deanpolk@njaes.rutgers.edu)¹, Chelsea Abegg¹, Cesar Rodriguez-Saona² and Dennis vanEngelsdorp³, ¹Rutgers, The State Univ. of New Jersey, Bridgeton, NJ, ²Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, ³Univ. of Maryland, College Park, MD

10:00 0243 Wild pollinators improve production, uniformity, and timing of blueberry crops. **Charlie Nicholson** (ccnichol@uvm.edu), Univ. of California, Davis, CA

10:10 0244 Hornfaced mason bee (*Osmia cornifrons*) larval pollen provisions indicate foraging preference for Rosaceae host-plant species and suggest efficient orchard crop pollination. **Anthony Vaudo** (adavaudo@gmail.com)¹, David Biddinger², Wiebke Sickel³, Alexander Keller⁴ and Margarita López-Uribe⁵, ¹Univ. of Nevada, Reno, NV, ²Pennsylvania State Univ. Fruit Research and Extension Center, Biglerville, PA, ³Univ. of Bonn, Bonn, Germany, ⁴Univ. of Würzburg, Würzburg, Germany, ⁵Pennsylvania State Univ., University Park, PA

10:20 0245 Revealing nesting bee habitat components by identifying structural plant material through next generation DNA sequencing. **Colleen Satyshur** (csatyshu@umn.edu), Erin Treiber and Daniel Cariveau, Univ. of Minnesota, St. Paul, MN

10:30 Break

10:40 0246 Evaluation of trapping methods for pollinator sampling in southern agroecosystems. **Katherine Parys** (katherine.parys@ars.usda.gov)¹, Terry Griswold², Nathan Little¹ and K. Clint Allen¹, ¹USDA - ARS, Stoneville, MS, ²USDA - ARS, Logan, UT

10:50 0247 Do pesticides disrupt pollination by wild and managed bees? **Elias Bloom** (bloome1@msu.edu)¹, Thomas Wood¹, Keng-Lou Hung², John Ternest^{3,4}, Laura Ingwell⁴, Karen Goodell⁵, Ian Kaplan⁴ and Zsofia Szendrei¹, ¹Michigan State Univ., East Lansing, MI, ²The Ohio State Univ., Columbus, OH, ³Univ. of Florida, Gainesville, FL, ⁴Purdue Univ., West Lafayette, IN, ⁵The Ohio State Univ., Newark, OH

Oral Presentations

11:00 **0248** Do nesting traits effect resilience to environmental perturbation? A review of natural history and possible responses. **Alexandra Harmon-Threath** (aht@illinois.edu), Univ. of Illinois, Champaign, IL

11:10 **0249** The landscape legacy of urban green spaces and its implications for pollinator conservation in cities. **Frances S. Sivakoff** (sivakoff.3@osu.edu), The Ohio State Univ., Marion, OH

11:20 **0250** Characterizing the bee community of an abandoned strip mine at the Flight 93 National Memorial. **John Wenzel** (wenzelj@carnegiemnh.org) and Andrea Kautz, Carnegie Museum of Natural History, Rector, PA

Member Symposium: Arthropod-Vertebrate Molecular Interactions and Pathogen Emergence

Room 121 (America's Center)

Moderators and Organizers: Berlin Londoño-Renteria and Sapna Menghwar, Kansas State Univ., Manhattan, KS

10:00 Introductory remarks

10:00 **0251** The role of exosomes in the dengue virus vector-host transmission cycle. Alex Gold, Sultan Asad, Fabiana Feitosa-Suntheimer, Ricardo Araujo and **Tonya Colpitts** (tmcol@bu.edu), Boston Univ., Boston, MA

10:15 **0252** Complexities in dynamic control of the tick salivary glands. **Yoonseong Park** (ypark@ksu.edu), Kansas State Univ., Manhattan, KS

10:30 **0253** Persistence of afebrile submicroscopic *Plasmodium* spp. infections in an endemic area for malaria in Colombia. **Jehidys Montiel** (jehidys.montiel@udea.edu.co), Luisa Carbal-Reyes, Lina Zuluaga Idarraga, Ana Vasquez, Daniel Aguirre and Alberto Tobon, Univ. de Antioquia, Medellin, Colombia

10:45 **0254** Molecular analysis of engorged sand flies for identification of blood meal sources and detection of *Leishmania* and *Bartonella* DNA. Marissa Lozano¹, Liz Espada¹, Victor Zorrilla¹, Michael Kosoy Kosoy², Clifton McKee² McKee², Lynn Osikowicz², Heriberto Arevalo³, Mario Troyes⁴, Craig Stoops¹, Michael Fisher⁵ and **Gissella Vasquez** (gissella.m.vasquez.ln@mail.mil)¹, ¹US Naval Medical Research Unit 6, Callao, Peru, ²Centers for Disease Control and Prevention, Fort Collins, CO, ³San Martin Regional Health Directorate, Tarapoto, Peru, ⁴Jaen Health Directorate, Jaen, Peru, ⁵US Naval Medical Research Unit 6, Lima, Peru

11:00 Break and poster session

SD0255 Carry-over effects of two larvicidal botanicals (*Jatropha curcas* Linn and *Azadirachta indica* A. Juss) on *Anopheles gambiae* s.l. mosquitoes in Accra metropolis, Ghana. **Abundance Osaretin** (osaretinabundance@gmail.com)¹ and Fred Aboagye-Antwi², ¹Univ. of Ghana, Accra, Ghana, ²Univ. of Ghana, Legon, Ghana

SD0256 Feeding preference of laboratory reared *Anopheles* sp. for preserved human blood in CPD anticoagulant using an in vitro blood-feeding system. **Kanchana Pantuwatana** (kanchanap@afrims.org), Siriporn Phasomkusolsin, Jaruwan Tawong, Orawan Wongnet, Nantaporn Monkanna, Tanaporn Kornkan, Katherine Poole-Smith, Silas Davidson and Wesley McCurdle, Armed Forces Research Institute of Medical Sciences, Bangkok, Thailand

SD0257 Interacting effects of larval and adult nutrition on *Aedes aegypti* life history traits and immune responses against dengue infection. **Jiayue Yan** (jiayue@illinois.edu), Roumaissa Kibech, Andrew Mackay, Chang-Hyun Kim and Chris Stone, Illinois Natural History Survey, Champaign, IL

SD0258 Potential involvement of salivary cholinesterase activity in arthropod vector-borne disease transmission. **Kevin B. Temeyer** (kevin.temeyer@ars.usda.gov), Kristie Schlechte and Adalberto A. Pérez de León, USDA - ARS, Kerrville, TX

11:15 **0259** Human serum factors can modulate apoptosis in *Aedes aegypti* mosquito midguts during viral infection. **Seokyung Kang** (skang1@ufl.edu)¹, Jasmine Ayers¹, Rhoe Dinglasan² and Lei Zhou¹, ¹Univ. of Florida, Gainesville, FL, ²Centers for Disease Control and Prevention, Gainsville, FL

11:30 **0260** Enhancing RNAi in *Aedes aegypti* using insight from beetles. **Kristopher Silver** (ksilver@ksu.edu), Kyah Featherston, Sapna Menghwar, Soheila Fatehi Fatehi, Yoonseong Park and Kun Yan Zhu, Kansas State Univ., Manhattan, KS

11:45 **0261** Effects of blood meals on vesicular stomatitis virus titers within *Culicoides* midges. **Paula Rozo-Lopez** (paularozo@ksu.edu)¹, Berlin Londoño-Renteria¹ and Barbara Drole², ¹Kansas State Univ., Manhattan, KS, ²USDA - ARS, Manhattan, KS

12:00 Concluding remarks

3-min: All Sections

Room 124 (America's Center)

Moderators and Organizers: Rayda K. Krell¹ and Patricia Prasifka², ¹Western Connecticut State Univ., Danbury, CT, ²Corteva Agriscience, West Fargo, ND

Due to the rapid speed of delivery, specific times are not listed for individual talks in this section. Each talk will be limited to a total of 3 minutes; talks will be given in sequential order as listed below starting at 10:00 AM with no pauses for withdrawn or no-show presenters.

10:00 AM – 11:15 AM

0262 Presentation withdrawn

0263 Identification of collected ant specimens by using different tested baits. **Aysha Zahid** (aysha.zahid001@gmail.com) and Sohail Ahmed, Univ. of Agriculture, Faisalabad, Pakistan

0264 Social parasitism in ants (Hymenoptera: Formicidae): Coevolution, biogeography, and unanswered questions. **Aldo De la Mora** (aldodelamora@gmail.com) and Jessica Purcell, Univ. of California, Riverside, CA

0265 Faunal diversity of flies (Diptera) in Ajmer Rajasthan, India. **Rashmi Sharma** (sharmarashmigca@gmail.com), Maharshi Dayanand Saraswati Univ., Ajmer, India

0266 Biodiversity of Scarabinae from Mansehra District, Khyber Pakhtunkhwa, Pakistan. **Sultan Zaib** (sultanzaib72@gmail.com), Government Degree College Nathiagali, Abbottabad, Pakistan

0267 Low oxygen effects on two stored-product pests: Implications for maintaining effectiveness of hypoxia. **Anastasia Njoroge** (annwanjiru608@gmail.com), Purdue Univ., West Lafayette, IN

0268 Integrated management of *Trogoderma granarium* (Everts) using neem leaf extract, diatomaceous earth and *Beauveria bassiana*. **Muhammad Sagheer** (sagheershari@yahoo.com), Sidra Rafi, Mansoor ul Hasan, Mirza Muhammad Usman Hayat and Muhammad Awais, Univ. of Agriculture, Faisalabad, Pakistan

0269 Nitrogen content of *Coptotermes gestroi* (Blattodea: Rhinotermitidae) exuviae. **Reina Tong** (reinat@ufl.edu), Thomas Chouvinc and Nan-Yao Su, Univ. of Florida, Davie, FL

Oral Presentations

0270 Functional presumption based upon comparative study with scanning electron microscopy on the antennal sensilla of two main castes of *Coptotermes formosanus* Shiraki (Blattodea: Rhinotermitidae). **Fu Bingxian** (361319202@qq.com), Zhejiang A&F Univ., Hangzhou, China

0271 Revised EPA product performance test guideline 810.3500 premises treatments: Efficacy testing to support registration of pesticide products applied in or around premises. **Jennifer Saunders** (saunders.jennifer@epa.gov) and Jacquelyn Herrick, US Environmental Protection Agency, Arlington, VA

0272 Sublethal effects of entomopathogenic nematodes and fungi against the red palm weevil *Rhynchophorus ferrugineus* (Oliver) (Coleoptera: Curculionidae). **Mujahid Manzoor** (mujahid.iags@pu.edu.pk)¹, Jam Nazeer Ahmad², Robin Michael Giblin Davis³, Nazir Javed² and Muhammad Saleem Haider¹, ¹Univ. of the Punjab, Lahore, Pakistan, ²Univ. of Agriculture, Faisalabad, Pakistan, ³Univ. of Florida, Davie, FL

0273 Presentation withdrawn

0274 The collaborative inter-agency response to Japanese beetle, *Popillia japonica*, in Vancouver, British Columbia. **Gail Wallin** (gwallin@bcinvasives.ca), Invasive Species Council of British Columbia, Williams Lake, BC, Canada

0275 Parasitism potential of *Anisopteromalus calandraceus* (Howard) against different insects in grains treated with diatomaceous earth. **Khurram Mahmood Sultan Kamboh** (kmsk55@gmail.com)¹, Muhammad Anjum Aqueel², Muhammad Sagheer³, Mansoor ul Hassan Sahi³ and Qurban Ali⁴, ¹Univ. of Sargodha, Faisalabad, Pakistan, ²Univ. of Sargodha, Sargodha, Pakistan, ³Univ. of Agriculture, Faisalabad, Pakistan, ⁴Ayub Agricultural Research Institute, Faisalabad, Pakistan

0276 Eco-friendly management of major insect pests of sesame. **Reena Sinha** (bkreena12@gmail.com)¹, Anil Kumar², Bhav Sinha², Arvind Singh¹, Brinder Singh¹, Jai Kumar¹ and Arun Jha¹, ¹Sher-e-Kashmir Univ. of Agricultural Sciences and Technology, Bari Brahmana, India, ²Sher-e-Kashmir Univ. of Agricultural Sciences and Technology, Jammu, India

0277 Aphid population and biochemical changes affected by paclobutrazol and partial root drying technique in tomato (*Solanum lycopersicum* L.). **Bhav Sinha** (sinhabikumar12@gmail.com)¹, Muneeba Banoo¹, Reena Sinha², Moni Gupta¹ and Gurdev Chand¹, ¹Sher-e-Kashmir Univ. of Agricultural Sciences and Technology, Jammu, India, ²Sher-e-Kashmir Univ. of Agricultural Sciences and Technology, Bari Brahmana, India

0278 A possible cryptic species of *Trialeurodes vaporariorum* with unusual host-plant range in northeastern Mexico. **Renato Villegas-Luján** (renato_villegas1988@hotmail.com)¹, Marcela Vasquez², Oscar Sanchez-Flores¹, Kevin Keegan³, Robert Gilbertson² and Sergio Sanchez-Peña¹, ¹Univ. Autónoma Agraria Antonio Narro, Saltillo, CU, Mexico, ²Univ. of California, Davis, CA, ³Univ. of Connecticut, Storrs, CT

0279 Guatemalan potato moth: A problem with altitude in Colombia. **Luis Cubillos-Quijano** (u7500113@unimilitar.edu.co)¹, Marco Díaz¹ and Natali Bello-Castañeda², ¹Univ. Militar Nueva Granada, Cajicá, Colombia, ²Federación Colombiana de Productores de Papa, Bogotá, Colombia

0280 Post-hurricane beetle activity in longleaf pine: A resilient tree in a resistant landscape. **Thomas Sheehan** (tsheehan@jonesctr.org)¹ and Kier Klepzig², ¹Jones Center at Ichauway, Newton, GA, ²The Jones Center at Ichauway, Newton, GA

0281 First results of Czech EXTEMIT-K bark beetle project: Genome and bark beetle dog. **Fredrik Schlyter** (fredrik.schlyter@slu.se), Czech Univ. of Life Sciences, Prague, Czech Republic

0282 Presentation withdrawn

0283 Sensilla of the antennae and ovipositor of adults of the agave red worm, *Comadia redtenbacheri* (Lepidoptera: Cossidae). **Ricardo Castro-Torres** (castro.ricardo@colpos.mx) and Celina Llanderal-Cázares, Colegio de Postgraduados, Texcoco, Mexico

0284 Which landscapes are best for honey bees? **Hannah Gaines-Day** (hgaines@wisc.edu), Sainath Suryanarayanan and Claudio Gratton, Univ. of Wisconsin, Madison, WI

0285 Would you hug a tarantula? Supporting college student comfort with live arthropods to increase their understanding of ecology in non-science major biology. **Faith Weeks** (fweeks@towson.edu), Towson Univ., Towson, MD

10-min: MUVE, Vector Surveillance

Room 122 (America's Center)

Moderators: Stacey Vigil¹ and Shaun Dergousoff², ¹Univ. of Georgia, Athens, GA, ²Agriculture and Agri-Food Canada, Lethbridge, AB, Canada

10:00 **0286** Tracking louse fly (Diptera: Hippoboscidae) host preferences and seasonality on songbirds in southwestern Pennsylvania, and uncovering their role in avian disease ecology.

Andrea Kautz (kautza@carnegiemnh.org), Carnegie Museum of Natural History, Rector, PA

10:10 **0287** Oviposition preferences of the mosquito *Aedes aegypti* Linnaeus, 1762 (Culicidae): An urban environment bioassay. **Daniel Simões** (danielalbeny@gmail.com)¹, Nádia Kroth¹, Gilberto Cozzer¹ and Jennifer Breaux², ¹Univ. Comunitária da Região de Chapecó, Chapecó, Brazil, ²New Orleans Mosquito, Termite and Rodent Control Board, New Orleans, LA

10:20 **0288** Surveillance of *Culicoides* spp. (Diptera: Ceratopogonidae) at epizootic hemorrhagic disease outbreak locations in Michigan. **Stacey Vigil** (svigil@uga.edu)¹, Michelle Rosen², Stephen Schmitt², Robert Pfannenstiel³ and Mark Ruder¹, ¹Univ. of Georgia, Athens, GA, ²Michigan Dept. of Natural Resources, Lansing, MI, ³USDA - APHIS, Riverdale, MD

10:30 **0289** High infestation of invasive *Aedes* mosquitoes in used tires along the local transport network of Panama. Kelly Bennett¹, Carmelo Gómez Martínez¹, Alejandro Almanza², Jose Rovira³, W. O. McMillan⁴, Vanessa Enríquez⁵, Elia Enríquez⁵, Marcela Díaz⁵, Javier Sanchez-Galan², Ari Whiteman⁶, **Rolando Gittens** (rgittens@indicasat.org.pa)⁷ and Jose Loaiza², ¹Smithsonian Tropical Research Institute, Panama City, Panama, ²INDICASAT AIP, Ciudad del Saber, Panama, ³Instituto Conmemorativo Gorgas de Estudios de la Salud, Panama City, Panama, ⁴Smithsonian Tropical Research Institute, Gamboa, Panama, ⁵Univ. of Texas, El Paso, TX, ⁶Univ. of North Carolina, Charlotte, NC, ⁷INDICASAT AIP, Panama City, Panama

10:40 **0290** Immature *Ixodes scapularis* (Acari: Ixodidae) collected from *Peromyscus leucopus* and *Peromyscus maniculatus* nests in Northern Wisconsin (USA). **Ryan Larson** (rlarson@wisc.edu), Gebbiena Bron, Xia Lee, Tela Zembsch and Susan Paskewitz, Univ. of Wisconsin, Madison, WI

Oral Presentations

10:50	0291	Presentation withdrawn	2:50	Panel discussion
11:00	0292	Field validation of distribution models for <i>Dermacentor andersoni</i> and <i>Dermacentor variabilis</i> in western Canada. Shaun Dergousoff (shaun.dergousoff@canada.ca) ¹ , Tim Lysyk ² , Neil Chilton ³ and Katerlyn Rochon ⁴ , ¹ Agriculture and Agri-Food Canada, Lethbridge, AB, Canada, ² Retired, Lethbridge, AB, Canada, ³ Univ. of Saskatchewan, Saskatoon, SK, Canada, ⁴ Univ. of Manitoba, Winnipeg, MB, Canada	3:20	Break
			3:35	Re-introduction to Mentimeter
			3:40	0298 Advocate entomology at minority serving institutions: Increasing diversity in the discipline. Veronica Manrique (veronica_manrique@subr.edu), Southern Univ. and A&M College, Baton Rouge, LA
			3:55	0299 On the complexities of reaching out to Hispanic and Latino students. Monique Rivera (monique.rivera@ucr.edu), Univ. of California, Riverside, CA
			4:10	0300 Diversity and inclusion in mentoring: Preparing students to thrive in a biased world. Raul F. Medina (rfmedina@tamu.edu), Texas A&M Univ., College Station, TX
			4:25	0301 Taking an institutional approach to gender equity in academia – my experience with Australia's SAGE framework for gender equity in STEMM. Margaret Mayfield (m.mayfield@uq.edu.au), Univ. of Queensland, Brisbane, QLD, Australia
			4:40	0302 Arriving at equity sideways: Using behavioral design to change diversity dynamics. Gail Kampmeier (gkamp@illinois.edu) ¹ and Phyllis Weintraub ² , ¹ Illinois Natural History Survey, Champaign, IL, ² Agricultural Research Organization, The Volcani Center, Gilat, Israel
			4:55	Panel discussion
				MUVE Section Symposium: Advocate Research and Development of Insect Repellents
				Room 120 (America's Center)
				Moderator and Organizer: Mustapha Deboun, Harris County Public Health, Houston, TX
			1:30	Welcoming remarks
			1:35	0303 Repellency of undecanoic acid and lauric acid ester analogs against <i>Aedes aegypti</i> . Charles Cantrell (charles.cantrell@ars.usda.gov) ¹ and Abbas Aali ² , ¹ USDA - ARS, Univ., MS, ² Univ. of Mississippi, Univ., MS
			1:50	0304 Unexpected synergistic repellency from mixtures containing pyrethroid derivatives. Jeffrey Bloomquist (jbquist@epi.ufl.edu), Univ. of Florida, Gainesville, FL
			2:05	0305 Development of biorational products as spatial mosquito repellents. Caleb Corona (clcorona@iastate.edu), James Klimavicz and Joel R. Coats, Iowa State Univ., Ames, IA
			2:20	0306 Public health value of a spatial repellent to protect against malaria infection on Sumba Island, Indonesia. Nicole L. Achee (nachee@nd.edu), Univ. of Notre Dame, South Bend, IN
			2:35	0307 Targeting ticks with terpene-type repellents. Joel R. Coats (jcoats@iastate.edu), Colin Wong, Jacob Johnson and Kylie Crystal, Iowa State Univ., Ames, IA
			2:50	Break
			3:05	0308 Effective pest management in agriculture and vector control using repellents. Agenor Mafra-Neto ¹ and Ligia Bortoli (ligia_bortoli@hotmail.com) ² , ¹ ISCA Technologies, Inc, Riverside, CA, ² ISCA Tecnologias Ltda, Ijuí, Brazil

Oral Presentations

3:20 **0309** Development of a new natural-based mosquito repellent product. **Abbas Aali** (aali@olemiss.edu), Univ. of Mississippi, Univ., MS

3:35 **0310** Kitchen eviction: A green approach to household repellency. **Emily Kuhns** (emilykuhns@gmail.com), Lacey Cole and Robert Bedoukian, Bedoukian Research, Inc, Danbury, CT

3:50 **0311** Characterization of a novel acting mosquito repellent formulation: Consideration of the methods for expressing repellent efficacy. **Larry Goodyer** (lgoodyer@dmu.ac.uk), De Montfort Univ., Gateway, United Kingdom

4:05 **0312** Evaluation of a novel mosquito feeding-deterrant isolated from bacteria. **Susan Paskewitz** (smpaskew@wisc.edu), Univ. of Wisconsin, Madison, WI

4:20 **0313** Repellency of novel catnip oil extracts against bed bugs. **Changlu Wang** (changluw@rutgers.edu)¹, Xianhui Shi², James Simon¹ and Qingli Wu¹, ¹Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, ²South China Agricultural Univ., Guangzhou, China

4:35 **0314** Pursuit of tarsal DEET receptors in biting flies. **Robert Renthal** (robert.renthal@utsa.edu)¹, Pia Olafson² and Adalberto A. Pérez de León², ¹Univ. of Texas, San Antonio, TX, ²USDA - ARS, Kerrville, TX

PBT Section Symposium: Insecticidal RNAi: New Invertebrate Targets, Mode of Action, and Resistance

Room 274 (America's Center)

Moderators and Organizers: Ana Vélez¹, June-Sun "Sunny" Yoon², Swati Mishra³, and William Moar⁴, ¹Univ. of Nebraska, Lincoln, NE, ²Cornell Univ., Ithaca, NY, ³Univ. of Tennessee, Knoxville, TN, ⁴Bayer Crop Science, Chesterfield, MO

1:30 Welcoming remarks

1:35 **0315** Novel gene targets for RNAi control of Lepidoptera pests. **Bala Venkata** (bpvenkata@danforthcenter.org)¹, Rob Polzin¹, Candace Seeve², Brad Fabbri² and Nigel Taylor¹, ¹Danforth Plant Science Center, St. Louis, MO, ²TechAccel LLC, Saint Louis, MO

1:50 **0316** RNAi as reverse genetics tool in two-spotted spider mite, *Tetranychus urticae*. Nicolas Bensoussan¹, Sameer Dixit¹, Noureldin Ghazy², Takeshi Suzuki², Zoran Culo¹, Vladimir Zhurov¹, Miodrag Grbic¹ and **Vojislava Grbic** (vgrbic@uwo.ca)¹, ¹Univ. of Western Ontario, London, ON, Canada, ²Tokyo Univ. of Agriculture and Technology, Tokyo, Japan

2:05 **0317** Development dsRNA delivery methods for gene knockdown in mosquitoes. **Dhandapani Ramesh** (rku233@uky.edu) and Reddy Palli, Univ. of Kentucky, Lexington, KY

2:20 **0318** RNAi targeting of osmoregulatory genes to control the grape mealybug, *Pseudococcus maritimus*. **Arinder Arora** (aka76@cornell.edu)¹, Gregory Loeb², Karen Wentworth², Stephen P. Hesler², Marc F. Fuchs² and Angela E. Douglas¹, ¹Cornell Univ., Ithaca, NY, ²Cornell Univ., Geneva, NY

2:35 **0319** Molecular characterization of the insecticidal activity of double-stranded RNA targeting the smooth septate junction of western corn rootworm (*Diabrotica virgifera virgifera*). **Courtney Davis Vogel** (courtney.vogel@corteva.com)¹, Xu Hu¹, Joe Steimel¹, Deirdre Kapka-Kitzman¹, Nina Richtman¹, John Mathis¹, Mark Nelson¹, Albert Lu¹ and Gusui Wu², ¹Corteva Agriscience, Johnston, IA, ²Syngenta, Research Triangle Park, NC

2:50 **0320** Mechanisms of RNAi in southern green stink bugs. **Dhandapani Gurusamy** (dhandapani.gurusamy@uky.edu) and Reddy Palli, Univ. of Kentucky, Lexington, KY

3:05 **0321** Variation in RNAi susceptibility in the pea aphid *Acyrthosiphon pisum*. **June-Sun "Sunny" Yoon** (jy389@cornell.edu) and Angela E. Douglas, Cornell Univ., Ithaca, NY

3:20 Break

3:35 **0322** Factors on dsRNA stability and cellular uptake important for RNAi efficacy in pest insects. **Olivier Christiaens** (olchrist.christiaens@ugent.be)¹, Zarel M. Reyna¹, Mirjam G. Tardajos¹, Mamoni Dash¹, Katherine Prentice¹, Rohit Sharma¹, Nathaly L. Castellanos¹, Kristof De Schutter¹, Luc Swevers², Els Van Damme¹, Peter Dubrule¹ and Guy Smagghe¹, ¹Ghent Univ., Ghent, Belgium, ²National Centre of Scientific Research Demokritos, Athens, Greece

3:50 **0323** Improving RNA suppression, across arthropods, microbes, pathogens, and plants. **Wayne Hunter** (wayne.hunter@ars.usda.gov)¹, Jackie Metz², John M. Tomich³, Christopher Holland¹, Andres Mojica⁴, Greg McCollum¹, William Rodney Cooper⁵, Thomson Paris⁶, Michael Boyle⁷, Michael Miles⁷, Godfrey Miles⁶, Veenu Aishwarya⁸, Sidney Altman⁹ and Kirsten Pelz-Stelinski⁴, ¹USDA - ARS, Fort Pierce, FL, ²Florida Atlantic Univ. Harbor Branch, Fort Pierce, FL, ³Kansas State Univ., Manhattan, KS, ⁴Univ. of Florida, Lake Alfred, FL, ⁵USDA - ARS, Wapato, WA, ⁶Univ. of Florida, Fort Pierce, FL, ⁷Smithsonian Marine Station, Fort Pierce, FL, ⁸AUM LifeTech, Inc, Philadelphia, PA, ⁹Yale Univ., New Haven, CT

4:05 **0324** New insights into the mechanism of resistance to non-transformative RNAi in Colorado potato beetle. **Swati Mishra** (smishra8@vols.utk.edu)¹, James Dee¹, Nayma Dias², William Moar³, Jodie Beattie⁴ and Juan-Luis Jurat-Fuentes¹, ¹Univ. of Tennessee, Knoxville, TN, ²Univ. Federal de Pelotas, Pelotas, Brazil, ³Bayer Crop Science, Chesterfield, MO, ⁴Bayer Crop Science, St. Louis, MO

4:20 **0325** Characterization of western corn rootworm life-history parameters and resistance against RNAi maize. **Amit Sethi** (amit.sethi@corteva.com), Jian-Zhou (Joe) Zhao, Matt Wihlm, Ashley Miles, Dianna Gillespie, Benchie Ortegon and Erick Hernandez, Corteva Agriscience, Johnston, IA

4:35 **0326** Variation in susceptibility of European populations of Colorado potato beetle towards RNAi. **Sonja Mehlhorn** (sonjagabriele.mehlhorn.ext@bayer.com)¹, Gregor Bucher², Sven Geibel³ and Ralf Nauen³, ¹Georg-August-Univ., Göttingen, Germany, ²Univ. of Göttingen, Göttingen, Germany, ³Bayer Crop Science, Monheim am Rhein, Germany

4:50 **0327** Using adult western corn rootworm to monitor susceptibility of field populations to RNAi. **Matthew Welter** (mjwelter@huskers.unl.edu)¹, Lance Meinke¹, Chitvan Khajuria², William Moar³ and Ana Vélez¹, ¹Univ. of Nebraska, Lincoln, NE, ²Bayer Crop Science, St. Louis, MO, ³Bayer Crop Science, Chesterfield, MO

5:05 Discussion

5:25 Concluding remarks

Oral Presentations

PBT Section Symposium: INsecticide TArgets and Resistance (INSTAR) Summit

Room 266 (America's Center)

Moderators and Organizers: Troy Anderson¹, Daniel Swale², Jeffrey Bloomquist³, John Clark⁴, Kun Yan Zhu⁵ and Thomas Sparks⁶, ¹Univ. of Nebraska, Lincoln, NE, ²Louisiana State Univ., Baton Rouge, LA, ³Univ. of Florida, Gainesville, FL, ⁴Univ. of Massachusetts, Amherst, MA, ⁵Kansas State Univ., Manhattan, KS, ⁶Corteva Agriscience, Indianapolis, IN

1:30 Introductory remarks

1:35 **0328** Perspective on ectoparasite host-seeking mechanisms and repellent studies. **Vincent Salgado** (vincent.salgado@basf.com), BASF Corporation, Research Triangle Park, NC

2:05 **0329** Repelling mosquitoes using chemicals on skin, clothing and in the air: What we know and don't know regarding their use. **Uli Bernier** (uli.bernier@ars.usda.gov), USDA - ARS, Gainesville, FL

2:20 **0330** *Drosophila melanogaster* as a model for insecticide toxicology studies. **Jeff Scott** (jgs5@cornell.edu), Cornell Univ., Ithaca, NY

2:35 **0331** Presentation withdrawn

2:50 Discussion

3:20 **0332** Translating biotechnological approaches for the advancement of insecticide science. **Reddy Palli** (rpalli@uky.edu), Univ. of Kentucky, Lexington, KY

3:35 **0333** Perspectives of technologies for tick vaccine development. **Albert Mulenga** (amulenga@cvm.tamu.edu), Texas A&M Univ., College Station, TX

3:50 **0334** Perspectives on commercialization for public health products. **Helen Pates Jamet** (hpj@vestergaard.com), Vestergaard, Washington, DC

4:20 **0335** Perspectives on commercialization for food security. **Sonny Ramaswamy** (sonny@nwccu.org), Northwest Commission on Colleges and Universities, Redmond, WA

4:50 Concluding remarks

P-IE Section Symposium: "Callows" and "Pre-Imaginal" Professionals of Pollination Research

Room 262 (America's Center)

Moderators and Organizers: Nicholas Anderson, Jonathan Tetlie and C. Scott Clem, Univ. of Illinois, Champaign, IL

1:30 Welcoming remarks

1:35 **0336** Syrphing the wind: Investigating the migratory strategies of Midwestern hover flies (Diptera: Syrphidae). **C. Scott Clem** (carlc2@illinois.edu) and Alexandra Harmon-Threatt, Univ. of Illinois, Champaign, IL

1:50 **0337** More than just milkweed: A survey of pollen found on *Chauliognathus* spp. (Coleoptera: Cantharidae) in Southeastern Virginia. **Katlyn Catron** (kcatron@vt.edu) and Thomas Kuhar, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

2:05 **0338** Improving forage resiliency to preserve a rare coastal bee *Hesperapis oraria*. **Alan Jeon** (lucanus95@gmail.com), Bashira Chowdhury, Gavin Shotts and Charles H. Ray, Auburn Univ., Auburn, AL

2:20 **0339** Diverse plates and picky eaters: On-farm diversification in an agriculturally dominated landscape positively influences specialist pollinators. **Aidee Guzman** (aideeguzman@berkeley.edu)¹, Marissa Chase^{1,2} and Claire Kremen^{1,3}, ¹Univ. of California, Berkeley, CA, ²Univ. of Illinois, Champaign, IL, ³The Univ. of British Columbia, Vancouver, BC, Canada

2:35 **0340** Diversified farming in a monoculture landscape: Effects on honey bee health and wild bee communities. **Ashley St. Clair** (astclair@iastate.edu)¹, Adam Dolezal², Ge Zhang¹, Matthew O'Neal¹ and Amy Toth¹, ¹Iowa State Univ., Ames, IA, ²Univ. of Illinois, Champaign, IL

2:50 **0341** The role of local and landscape factors in structuring the bee communities of prairie restorations, and their similarity to the communities of intact prairie remnants. **Ian Lane** (ianex173@umn.edu), Christina Herron-Sweet, Zachary Portman and Daniel Cariveau, Univ. of Minnesota, St. Paul, MN

3:05 **0342** Filling the spatial and temporal gaps in plant-pollinator networks in Europe. **Ambith Thompson** (ambith.thompson@idiv.de)^{1,2}, Demetra Rakosy^{2,3}, Elena Motivans^{2,3}, Leana Zoller^{1,2} and Tiffany Knight^{1,2,3}, ¹Martin-Luther-Univ., Halle (Saale), Germany, ²German Centre for Integrative Biodiversity Research, Leipzig, Germany, ³Helmholtz Centre for Environmental Research, Halle (Saale), Germany

3:30 **SP0343** Presentation withdrawn

3:30 Break

3:45 Poster session

SD0344 Changes in the phenology of the southeastern blueberry bee (*Habropoda laboriosa*) based on historic collections data. **Sarah Anderson** (andersonsarah@ufl.edu) and Rachel Mallinger, Univ. of Florida, Gainesville, FL

SD0345 Protecting wild bee β -diversity can conserve indigenous wild onion crops. **Danna Cadena-Garcia** (al151028@alumnos.uacj.mx)¹, Bashira Chowdhury², Alan Jeon² and Ana Gatica-Colima¹, ¹Univ. Autonoma de Ciudad, Juarez, Cl, Mexico, ²Auburn Univ., Auburn, AL

SD0346 How does diversification within a matrix influence pollinator community composition? **Gisel DeLaCerda** (giseldlc@berkeley.edu)¹, Aidee Guzman¹ and Paula Yang², ¹Univ. of California, Berkeley, CA, ²California State Univ., Fresno, CA

SD0347 The effects of phytochemicals of virally infected honey bees. **Edward Hsieh** (emhsieh2@illinois.edu), Adam Dolezal and May Berenbaum, Univ. of Illinois, Champaign, IL

SD0348 Comparing the insecticide sensitivity of monarch butterflies (*Danaus plexippus*) to bees and other butterflies. **Niranjana Krishnan** (nkrish@iastate.edu), Joel R. Coats and Steven Bradbury, Iowa State Univ., Ames, IA

SD0349 Native bee nesting rates in the presence of clothianidin in the soil of natural areas. **Jonathan Tetlie** (jtetlie2@illinois.edu) and Alexandra Harmon-Threatt, Univ. of Illinois, Champaign, IL

SD0350 Landscape-mediated effects of supplemental wildflower plantings on pollinator communities in Wisconsin cranberry agroecosystems. **Nolan Amon** (namon@wisc.edu) and Christelle Guédot, Univ. of Wisconsin, Madison, WI

4:15 Concluding remarks

Oral Presentations

P-IE Section Symposium: Advocacy in Action: Tackling Invasive Species through Collaboration, Policy, and Public Engagement

Room 241 (America's Center)

Moderators and Organizers: Jocelyn R. Holt¹, Meredith Spence Beaulieu², Molly Darlington³, Lina Bernaola⁴, Rebecca Zimler⁵, and Aditi Dubey⁶, ¹Texas A&M Univ., College Station, TX, ²North Carolina State Univ., Raleigh, NC, ³Univ. of Nebraska, Lincoln, NE, ⁴Louisiana State Univ., Baton Rouge, LA, ⁵Univ. of Florida, Vero Beach, FL, ⁶Univ. of Maryland, College Park, MD

1:30 Introductory remarks

1:35 **0351** Implementing a collaborative approach for extension on invasive species. **Colin Cassin** (ccassin@invasivespeciescentre.ca) and David Nisbet, Invasive Species Centre, Sault Ste. Marie, ON, Canada

1:50 **0352** Assembly and analysis of the Mexican fruit fly genome – advancing SIT genomics research through interagency collaborations. **Sheina Sim** (sheina.sim@ars.usda.gov)¹, Norman Barr², Pedro Rondon³ and Scott Geib¹, ¹USDA - ARS, Hilo, HI, ²USDA - APHIS, Edinburg, TX, ³USDA - APHIS, Guatemala City, Guatemala

2:05 **0353** Pennsylvania parasite hunters: Engaging hunters through citizen science and education on the status of ticks, deer keds, and tick-borne diseases. **Karen Poh** (kpp540@psu.edu)¹, Michael Skvarla¹, Amanda Jones², Vincent D'Amico³ and Erika Machtlinger¹, ¹Pennsylvania State Univ., University Park, PA, ²Walter Reed Army Institute of Research, Silver Spring, MD, ³USDA - Forest Service, Newark, DE

2:20 **0354** Connecting with policymakers about invasive species prevention and management. **Helen Spafford** (helen.spafford@hawaii.edu), Univ. of Hawai'i, Honolulu, HI

2:35 **0355** Invasive insects disrupting fruit integrated pest management programs. **Philip Fanning** (fanning9@msu.edu) and Rufus Isaacs, Michigan State Univ., East Lansing, MI

2:50 **0356** Advocacy in action: Using extension and research to promote IPM in field crops. **Erin Hodgson** (ewh@iastate.edu), Iowa State Univ., Ames, IA

3:05 Break

3:20 **0357** Managing invasive plants across the landscape: Using policy and programs to protect the health of our nation's forests and grasslands. **Vanessa Lopez** (vanessa.lopez@usda.gov), USDA - Forest Service, Washington, DC

3:35 **0358** How the threat of spotted lanternfly, *Lycorma delicatula* (Hemiptera: Fulgoridae), to the eastern USA demands cooperation at local, state, regional, and national level. **Dennis Calvin** (dcalvin@psu.edu) and Julie Urban, Pennsylvania State Univ., University Park, PA

3:50 **0359** Mamalu poepoe: Enhancing Hawai'i's biosecurity through interagency collaboration. **Leyla V. Kaufman** (leyla@hawaii.edu), Hawai'i Invasive Species Council, Honolulu, HI

4:05 **0360** Engaging citizen scientists in the search for biological controls of the invasive brown marmorated stink bug in Maryland: Everyone learns! **Paula Shrewsbury** (pshrewsbury@umd.edu) and Rebeccah A. Waterworth, Univ. of Maryland, College Park, MD

4:20 **0361** Lessons from using engagement to elicit potential impacts of emerging technologies in invasive pest management: *Drosophila suzukii* as a case study. **Johanna Elsensohn** (jeelsens@ncsu.edu), Adam Kokotovich, Jason Delborne and Hannah Burrack, North Carolina State Univ., Raleigh, NC

4:35 **0362** Boll weevil eradication: A success story of science in the service of policy. **Tyler Rasnick** (tjrasnick@gmail.com)¹, Lindsey Perkin², Charles Suh², Raul Ruiz-Arce³, C. Micheal Dickens¹ and Gregory Sword¹, ¹Texas A&M Univ., College Station, TX, ²USDA - ARS, College Station, TX, ³USDA - APHIS, Edinburg, TX

4:50 Discussion

5:05 Concluding remarks

SysEB Section Symposium: The Road to Sociality: Integrated Concepts of Social Behavior in Insects

Room 132 (America's Center)

Moderators and Organizers: Qian "Karen" Sun¹, Hongmei Li-Byarlay² and Thomas O'Shea-Wheller¹, ¹Louisiana State Univ., Baton Rouge, LA, ²Central State Univ., Wilberforce, OH

1:30 Welcoming remarks

1:35 **0363** Genomic imprinting and the origin of eusociality in termites. **Kenji Matsuura** (kenijijpn@kais.kyoto-u.ac.jp)¹ and Hiromu Ito², ¹Kyoto Univ., Kyoto, Japan, ²Nagasaki Univ., Nagasaki, Japan

1:50 **0364** Behavioral genetics and social evolution of the small carpenter bees. **Sandra Rehan** (sandra.rehan@unh.edu), York Univ., Toronto, ON, Canada

2:05 **0365** Behavioral epigenetics and DNA methylation in social insects. **Hongmei Li-Byarlay** (hli-byarlay@centralstate.edu), Central State Univ., Wilberforce, OH

2:20 **0366** Ecological and evolutionary factors influencing the coordinated response to predation threat in *Vespa* wasps. **Jennifer Jandt** (jjandt2@gmail.com), Univ. of Otago, Dunedin, New Zealand

2:35 **0367** Neurological and genetic mechanisms of sociality in bees. **Karen Kapheim** (karen.kapheim@usu.edu), Utah State Univ., Logan, UT

2:50 **0368** Social evolution in bees: Insights gained from studying evolution of advanced eusocial traits. **Etya Amsalem** (eua6@psu.edu), Pennsylvania State Univ., University Park, PA

3:05 **0369** Social regulation of insulin signaling and the evolution of eusociality in ants. **Vikram Chandra** (vchandra@rockefeller.edu)¹, Ingrid Fetter-Pruneda¹, Peter Oxley², Amelia Ritger³, Sean McKenzie⁴, Romain Libbrecht⁵ and Daniel Kronauer¹, ¹Rockefeller Univ., New York, NY, ²Weill-Cornell Medicine, New York, NY, ³Univ. of California, Santa Barbara, CA, ⁴Univ. de Lausanne, Lausanne, Switzerland, ⁵Johannes Gutenberg Univ., Mainz, Germany

3:20 **SP0370** Sociality and work: Cost savings during nest initiation by groups of harvester ant queens. **Jennifer H. Fewell** (j.fewell@asu.edu)¹, Rebecca Clark², Jürgen Gadau^{1,3} and Jon Harrison¹, ¹Arizona State Univ., Tempe, AZ, ²Univ. of California, Berkeley, CA, ³Univ. of Münster, Münster, Germany

3:30 Break

3:40 **0371** The ecology of collective behavior in ants. **Deborah M. Gordon** (dmgordon@stanford.edu), Stanford Univ., Stanford, CA

Oral Presentations

3:55 **0372** Information use and collective cognition in ants.

Stephen C. Pratt (stephen.pratt@asu.edu), Arizona State Univ., Tempe, AZ

4:10 **0373** A multi-level analysis of foraging behavior in honey bees. **Chelsea Cook** (cncook1@asu.edu)¹, Natalie Lemanski², Cahit Ozturk¹, Jürgen Gadau³, Brian Smith¹ and Noa Pinter-Wollman², ¹Arizona State Univ., Tempe, AZ, ²Univ. of California, Los Angeles, CA, ³Univ. of Münster, Münster, Germany

4:25 **0374** Monitoring the physiological status of honeybee colonies using long term trends of a range of bee vibrational pulses. **Martin Bencsik** (martin.bencsik@ntu.ac.uk), Nottingham Trent Univ., Nottingham, United Kingdom

4:40 **0375** Mechanisms underlying the origin of reproductive division of labor in eusocial Hymenoptera. **Andrew Suarez** (suarez2@illinois.edu)¹, Karen Kapheim² and Dietrich Gotzek³, ¹Univ. of Illinois, Champaign, IL, ²Utah State Univ., Logan, UT, ³Smithsonian Institution, National Museum of Natural History, Washington, DC

4:55 **0376** Behavioral regulation of reproductive conflicts in termites. **Qian "Karen" Sun** (qsun@agcenter.lsu.edu)¹, Jordan Hampton², Kenneth Haynes² and Xuguo Zhou², ¹Louisiana State Univ., Baton Rouge, LA, ²Univ. of Kentucky, Lexington, KY

5:10 **SP0377** Convergent evolution of termite tunneling with differentiated behavioral rules. **Nobuaki Mizumoto** (nobuaki.mzmt@gmail.com)¹, Paul Bardunias² and Stephen C. Pratt¹, ¹Arizona State Univ., Tempe, AZ, ²State Univ. of New York, Syracuse, NY

5:20 **SP0378** Split sex ratios between solitary and social nests in the facultatively eusocial sweat bee *Megalopta genalis*. **Adam Smith** (adam_smith@gwu.edu)¹, Karen Kapheim², Callum Kingwell³ and William Wcislo⁴, ¹George Washington Univ., Washington, DC, ²Utah State Univ., Logan, UT, ³Cornell Univ., Ithaca, NY, ⁴Smithsonian Tropical Research Institute, Panama City, Panama

SysEB Section Symposium: What Everyone Ought to Know about Insect Biodiversity in the Urban Environment

Room 123 (America's Center)

Moderators and Organizers: Isa Betancourt¹ and Greg Cowper²,

¹The Academy of Natural Sciences of Drexel Univ., Philadelphia, PA, ²Academy of Natural Sciences of Drexel Univ., Philadelphia, PA

1:30 Introductory remarks

1:35 **0379** Dung beetle diversity and decomposition of dog feces in urban and rural locations. **Steven Frank** (sdfrank@ncsu.edu) and Catherine Crofton, North Carolina State Univ., Raleigh, NC

1:50 **SP0380** Importance of landscape and local drivers for structuring ground-dwelling beetle communities in urban greenspaces. **Kayla I. Perry** (perry.1864@osu.edu)¹, Larry Phelan² and Mary Gardiner¹, ¹The Ohio State Univ., Columbus, OH, ²The Ohio State Univ., Wooster, OH

2:00 **SP0381** New species of *Solenopsis* "rodeo ants": Queen-riding social parasites from Texas. **Alex Wild** (alex.wild@utexas.edu), Univ. of Texas, Austin, TX

2:10 **0382** Do cities drive evolutionary change in insect mutualisms? **Elsa Youngsteadt** (ekyoungs@ncsu.edu)¹, Judith Bronstein², Paige S. Warren³ and Rebecca E. Irwin¹, ¹North Carolina State Univ., Raleigh, NC, ²Univ. of Arizona, Tucson, AZ, ³Univ. of Massachusetts, Amherst, MA

2:25 **0383** Non-adaptive urban evolution in arthropod populations. **Lindsay Miles** (lindsay.miles@utoronto.ca), Univ. of Toronto, Mississauga, ON, Canada

2:40 Break and poster session

SD0384 Orb-web spider responses to city life: Species replacement, phenotypic changes and consequences for ecosystem functioning. **Maxime Dahirel** (maxime.dahirel@yahoo.fr)^{1,2,3}, Jasper Dierick¹, Maarten De Cock¹ and Dries Bonte¹, ¹Ghent Univ., Ghent, Belgium, ²Univ. de Rennes, Rennes, France, ³INRA, Sophia-Antipolis, France

SD0385 Fountain of Science: How a historic center city fountain is being used to document the urban insect biodiversity of Philadelphia, Pennsylvania. **Isa Betancourt** (isb24@drexel.edu), The Academy of Natural Sciences of Drexel Univ., Philadelphia, PA

SD0386 Art and science join forces to promote entomological advocacy at a historic prison in Philadelphia, Pennsylvania.

Greg Cowper (gwc32@drexel.edu), Academy of Natural Sciences of Drexel Univ., Philadelphia, PA

SD0387 Ants of the Micronesian Islands of Guam, Saipan, Tinian, and Rota. **Ross Miller** (millerr@triton.ugr.edu), Univ. of Guam, Mangilao, Guam

SD0388 Mesophication and urbanization interact to drive hardwood forest diversity and structure and carabid beetle community diversity. **Michael Reisner** (michaelreisner@augustana.edu) and Tierney R. Brosius, Augustana College, Rock Island, IL

SD0389 Urban hardwood forest diversity and structure drive carabid beetle assemblages. **Tierney R. Brosius** (tierneybrosius@augustana.edu) and Michael Reisner, Augustana College, Rock Island, IL

3:05 **0390** Arthropods of our homes goes global: Data from homes across the world. **Matthew Bertone** (matt_bertone@ncsu.edu)¹, Misha Leong² and Michelle Trautwein², ¹North Carolina State Univ., Raleigh, NC, ²California Academy of Sciences, San Francisco, CA

3:20 **0391** Specimen: Exploring urban insect biodiversity within the walls of a historic Philadelphia, Pennsylvania prison. **Greg Cowper** (gwc32@drexel.edu), Academy of Natural Sciences of Drexel Univ., Philadelphia, PA

3:35 **0392** Pockets of green: The importance of botanical gardens for urban insect biodiversity. **Daniel Llavaneras** (dllavaneras@buin.zoo.cl), Parque Zoológico Buin Zoo, Buin, Chile

3:50 **SP0393** Rapid biodiversity assessment of Eulophidae (Hymenoptera) using multiplex and direct-PCR techniques. **Ryan Perry** (rperr003@ucr.edu), Univ. of California, Riverside, CA

4:00 **0394** If you plant it, they will come: How to make your yard a "field of dreams" for caterpillars and the birds that eat them. **Ashley Kennedy** (kennedy@udel.edu), Univ. of Delaware, Newark, DE

4:15 **SP0395** Butterfly diversity (Hesperioidae and Papilionoidea) in urban forest fragments of Curitiba, Paraná, Brazil. **Johan Pérez** (johan.perez@upctc.edu.co), Eduardo Carneiro, Mirna Casagrande and Olaf Mielke, Laboratório de Estudos de Lepidoptera Neotropical, Paraná, Brazil

4:25 Discussion

Oral Presentations

Member Symposium: Defying the Decline: Applied and Research-Based Conservation Initiatives Making a Difference in Sustaining Insect Biodiversity

Room 263 (America's Center)

Moderators and Organizers: Carrie Hall and Daniel Howard, Univ of New Hampshire, Durham, NH

1:30 Welcoming remarks

1:35 **0396** Searching for a six-legged needle in a haystack
The Lost Cricket Project. **Daniel Howard** (daniel.howard@unh.edu) and Carrie Hall, Univ. of New Hampshire, Durham, NH

1:50 **0397** If you build it they will come: Farm management practices can support pollinator diversity. **Colton O'Brien** (coltobrien@gmail.com) and Arathi Seshadri, Colorado State Univ., Fort Collins, CO

2:05 **0398** Conservation strategies for protecting tiger beetles and their habitats: Studies with listed species. C. Barry Knisley¹ and **Rodger Gwiazdowski** (rodger@advancedbioconsulting.com)², ¹Randolph-Macon College, Glen Allen, VA, ²Advanced BioConsulting, LLC, Shrewsbury, MA

2:20 **0399** Conserving insects in agricultural landscapes: Managing disturbance regimes to support natural enemies, pollinators and monarch butterfly. **Douglas A. Landis** (landisd@msu.edu), Nathan Haan, Sara Hermann and Andrew Myers, Michigan State Univ., East Lansing, MI

2:35 **0400** Undertaking undertaker insect conservation: The role of zoos in the recovery of an endangered beetle species. **Bob Merz** (merz@stlzoo.org), Saint Louis Zoo, St. Louis, MO

2:50 **SP0401** Insects facilitating ecologically based cattle management. **Ryan Schmid** (ryan.schmid@ecdysis.bio) and Jonathan Lundgren, Ecdysis Foundation, Estelline, SD

3:00 Break and poster session

SD0402 First documentation of larval diet of the caddisfly *Glyphospsyche missouri* (Trichoptera: Limnephilidae): An endemic species of conservation concern in Missouri, USA. Russell Rhodes¹, Barry Poulton² and **William Mabee** (william.mabee@mdc.mo.gov)³, ¹Missouri State Univ., Springfield, MO, ²US Geological Survey, Columbia, MO, ³Missouri Dept. of Conservation, Columbia, MO

SD0403 The necessity of high quality habitat when you're living on the edge: A case study of the Hudsonian emerald (*Somatocholra hudsonica*) in Boulder County, Colorado. **Kristofor Voss** (kvoss@regis.edu)¹ and Katrina Loewy², ¹Regis Univ., Denver, CO, ²Butterfly Pavilion, Westminster, CO

SD0404 Characterizing the arthropod community associated with Gambel oak shrub lands on the Palmer Divide. **Rachael Sitz** (rachael.sitz@colostate.edu)¹, Melissa Schreiner¹, Andrew Miller¹, Boris C. Kondratieff² and Whitney Cranshaw¹, ¹Colorado State Univ. Fort Collins, CO, ²C.P. Gillette Museum of Arthropod Diversity, Fort Collins, CO

3:10 **SP0405** Impacts of plant preference, and horticulture practices on ornamental plants, in regards to visiting pollinators. **Natalia Bjorklund** (natalia.bjorklund@unl.edu), Judy Wu-Smart and Thomas Weissling, Univ. of Nebraska, Lincoln, NE

3:20 **SP0406** Integrating conservation and pest management on golf courses. **Adam Dale** (agdale@ufl.edu), Grace Cope and Rebecca Perry, Univ. of Florida, Gainesville, FL

3:30 **0407** Understanding what works or what doesn't: Experimental reintroduction of the federally endangered Miami blue butterfly (*Cyclargus thomasi bethunebakeri*). **Jaret Daniels** (jdaniels@flmnh.ufl.edu), Florida Museum of Natural History, Gainesville, FL

3:45 0408 Native foods, native peoples, native pollinators:
A new initiative to support pollinators and Native Americans.
Edward Spevak (spevak@stlzoo.org), Saint Louis Zoo, St. Louis, MO

4:00 **0409** Beauty with benefits: Naturescaping Washington vineyards for butterfly conservation. **David G. James** (david_james@wsu.edu), Lorraine M. Seymour, Geraldine L. Lauby, and Katie Buckley, Washington State Univ., Prosser, WA

4:15 **0410** Banking for beetles: Evidence for population stability at the first insect conservation bank in Oklahoma. **Carrie Hall** (carrie.hall@unh.edu) and Daniel Howard, Univ. of New Hampshire, Durham, NH

Member Symposium: Forensic Entomology

Room 121 (America's Center)

Moderator and Organizer: Stephanie Olson, Arcadia Univ., Glenside, PA

1:30 Introductory remarks

1:35 **0411** Gene expression in forensic entomology – What is it good for? **Aaron Tarone** (tamlucilia@tamu.edu), Texas A&M Univ., College Station, TX

1:50 **0412** The role of a PMI-prediction model in evaluating forensic entomology experimental design, the importance of covariates, and the utility of response variables for estimating time since death. **Jeffrey Wells** (jedwell@fiu.edu)¹ and Lynn LaMotte², ¹Florida International Univ., Miami, FL, ²Louisiana State Univ., New Orleans, LA

2:05 **0413** Chemical attraction of ticks (Parasitiformis: Ixodidae) to decomposing animal remains. **Amanda Roe** (aroe@csm.edu), College of Saint Mary, Omaha, NE

2:20 **0414** Insects associated with human remains during the summer in Indiana. **Lauren Weidner** (lauren.weidner@asu.edu)¹ and Gregory Nigoghosian², ¹Arizona State Univ., Glendale, AZ, ²Purdue Univ., West Lafayette, IN

2:35 Break

2:50 **0415** Mechanisms regulating attraction and colonization of carrion by flies of forensic importance. **Zanthé Kotzé** (zanthek_2016@tamu.edu) and Jeffery K. Tomberlin, Texas A&M Univ., College Station, TX

3:05 **0416** Hide beetle life history traits depend on meat type and rotting duration (Coleoptera: Dermestidae). **Stephanie Olson** (solson_01@arcadia.edu), Karen Scott, Nikol Jurjevic and Tobias Landberg, Arcadia Univ., Glenside, PA

3:20 **0417** Forensic entomology indoors: The domesticated flies. **Michelle Sanford** (michelle.sanford@ifsf.hctx.net), Harris County Institute of Forensic Sciences, Houston, TX

3:35 **0418** Review of the molecular identification techniques for forensically important Diptera. M. Denise Gemmellaro¹, George C. Hamilton¹, Jessica Ware² and **Elena Forzisi** (ele.forzisi96@gmail.com)¹, ¹Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, ²Rutgers, The State Univ. of New Jersey, Newark, NJ

3:50 Concluding remarks

Oral Presentations

Member Symposium: Latest Advancements and Challenges in Insect Rearing and Testing

Room 275 (America's Center)

Moderators and Organizers: Chitvan Khajuria¹, Peter Jensen¹ and Cara Vazquez², ¹Bayer Crop Science, St. Louis, MO, ²Bayer Crop Science, Chesterfield, MO

1:30 Introductory remarks

1:35 **0419** Creation and applications of insect rearing science and technology. **Norman Leppla** (nleppla@ufl.edu), Univ. of Florida, Gainesville, FL

2:05 **0420** Rearing high quality insects for bioassays – an overview. **Abhilash Balachandran** (abilash.balachandran@coretva.com)¹, Steve Thompson², Jared Ostrem² and Navdeep Mutti¹, ¹Corteva Agriscience, Indianapolis, IN, ²Corteva Agriscience, Johnston, IA

2:20 **0421** Rearing high quality insects in a small town laboratory. **Chad Finkenbinder** (chad@benzonresearch.com), Benzon Research, Carlisle, PA

2:35 **0422** Trial by larvae: Advancing insect rearing one pupa at a time at the Union City Insectary. **Mohammad Amir Aghaei** (mohammadamir.aghaei@bayer.com) and Nancy Adams, Bayer Crop Science, Union City, TN

2:50 **0423** Best practices and challenges in monarch butterfly rearing. **Richard Hellmich** (richard.hellmich@ars.usda.gov) and Keith Bidne, USDA - ARS, Ames, IA

3:05 **SP0424** From 200 to 200,000: Common barriers to scale in insect rearing. **Tequila Snorkel** (tequila@ovipost.com), Ovipost, LaBelle, FL

3:15 Break

3:25 **0425** Improvements in corn rootworm larval artificial diets facilitate direct comparison of toxins, commercialization, resistance management, and new research. **Bruce Hibbard** (bruce.hibbard@ars.usda.gov)¹, Man Huynh², Mike Vella³, Kent S. Shelby¹, Adriano Pereira², Dalton Ludwick⁴, Lisa Meihls⁵ and Thomas Coudron¹, ¹USDA - ARS, Columbia, MO, ²Univ. of Missouri, Columbia, MO, ³Frontier Agricultural Services, Newark, DE, ⁴Virginia Polytechnic Institute and State Univ., Kearneysville, WV, ⁵USDA - ARS, St. Louis, MO

3:40 **0426** Establishment and rearing of the first dsRNA-resistant western corn rootworm, *Diabrotica virgifera virgifera* LeConte, colony. **Kaylee Miller** (kaylee.miller@bayer.com)¹, Chitvan Khajuria¹, Peter Jensen¹, Cara Vazquez¹, Chris Blume² and William Moar², ¹Bayer Crop Science, St. Louis, MO, ²Bayer Crop Science, Chesterfield, MO

3:55 **0427** Experience in establishing and maintaining Bt resistant colonies of *Spodoptera frugiperda* and *Helicoverpa zea*. **Fei Yang** (fyang@tamu.edu) and David Kerns, Texas A&M Univ., College Station, TX

4:10 **0428** Assays to identify stage-specific activity of insecticides on laboratory reared thrips. **Anders Huseth** (ashuseth@ncsu.edu) and George Kennedy, North Carolina State Univ., Raleigh, NC

4:25 **0429** Stink bugs (Pentatomidae) feeding behavior on plants and laboratory rearing. **Antônio Panizzi** (antonio.panizzi@embrapa.br) and Tiago Lucini, Embrapa Centro Nacional de Pesquisa de Trigo, Passo Fundo, Brazil

4:40 **0430** An artificial blood meal for mass production of mosquitoes. **Constance Darrisaw** (cdarrisaw@ufl.edu), Philip G. Koehler, Chris Batich, J. D. Kline, M. Bernier and Roberto Pereira, Univ. of Florida, Gainesville, FL

4:55 Panel discussion

5:05 Concluding remarks

Member Symposium: Linking Insect Movement Ecology with Applied Pest Management

Room 231 (America's Center)

Moderators and Organizers: Jhalendra Rijal¹, Govinda Shrestha² and Sudip Gaire³, ¹Univ. of California Agriculture and Natural Resources, Modesto, CA, ²Oregon State Univ., Hermiston, OR, ³Purdue Univ., West Lafayette, IN

1:30 Introductory remarks

1:35 **0431** Conducting interdisciplinary research into the area-wide management of insect pests. **Hazel R. Parry** (hazel.parry@csiro.au), CSIRO, Brisbane, QLD, Australia

2:05 **0432** Movement and distribution of stink bugs in cotton in the southeast. **Francis Reay-Jones** (freayjo@clemson.edu)¹, Jeremy Greene² and Michael Towes³, ¹Clemson Univ., Florence, SC, ²Clemson Univ., Blackville, SC, ³Univ. of Georgia, Tifton, GA

2:20 **0433** Insect flight mills study on Lygus shows potential flying capability. **Govinda Shrestha** (govinda.shrestha@oregonstate.edu)¹, Silvia Rondon¹ and Nik G. Wiman², ¹Oregon State Univ., Hermiston, OR, ²Oregon State Univ., Aurora, OR

2:35 **0434** Factors influencing dispersal of insect pests in agricultural systems. **Shimat Joseph** (svjoseph@uga.edu)¹, Ian Grettenberger², Midhula Gireesh¹ and Fawad Khan¹, ¹Univ. of Georgia, Griffin, GA, ²Univ. of California, Davis, CA

2:50 **0435** Impact of phenology and landscape on the movement of the navel orangeworm (Lepidoptera: Pyralidae) between almonds and walnuts. Charles Burks¹, **Houston Wilson** (houston.wilson@ucr.edu)², Jhalendra Rijal³ and Emily Symmes⁴, ¹USDA - ARS, Parlier, CA, ²Univ. of California, Parlier, CA, ³Univ. of California Agriculture and Natural Resources, Modesto, CA, ⁴Univ. of California, Oroville, CA

3:05 **0436** Use of spatial distribution in monitoring and managing arthropod pests including the role of natural enemies in multiple cropping systems. **Jhalendra Rijal** (rijal@ucdavis.edu), Univ. of California Agriculture and Natural Resources, Modesto, CA

3:20 Concluding remarks

Member Symposium: Mite Evolution

Room 126 (America's Center)

Moderators and Organizers: Samuel Bolton¹, Ray Fisher² and Adrian Brückner³, ¹Florida Dept. of Agriculture and Consumer Services, Gainesville, FL, ²Univ. of Arkansas, Fayetteville, AR, ³California Institute of Technology, Pasadena, CA

1:30 **0437** A just so story about mites. **Samuel Bolton** (samuel.bolton@freshfromflorida.com), Florida Dept. of Agriculture and Consumer Services, Gainesville, FL

1:45 **0438** On the embryology of Acari, historical observations and future directions. **Austen Barnett** (austen.barnett@desales.edu), DeSales Univ., Center Valley, PA

Oral Presentations

4:50 **0461** Can you bank on it? The economics of the *Aphidius colemani-Rhopalosiphum padi* system. **Tracey L. Payton** (tpayton@langston.edu)¹, Eric Rebek² and Roger Sahs², ¹Langston Univ., Stillwater, OK, ²Oklahoma State Univ., Stillwater, OK

5:05 **0462** Impacts of light quality on pest control in hydroponic lettuce production. **Laura Ingwell** (lingwell@purdue.edu)¹ and Reham Ibrahim Ahmed Mohamed², ¹Purdue Univ., West Lafayette, IN, ²Agricultural Research Centre, Giza, Egypt

5:20 **SP0463** Comparison of chordotonal organ modulators for their relative efficacies against aphids on greenhouse ornamental plants. **Juang-Horng Chong** (juanghc@clemson.edu), Clemson Univ., Clemson, SC

Member Symposium: Semiochemicals of Wood-Boring Beetles

Room 230 (America's Center)

Moderators and Organizers: Robert Mitchell¹ and Ann Ray², ¹Univ. of Wisconsin, Oshkosh, WI, ²Xavier Univ., Cincinnati, OH

1:30 Introductory remarks

1:35 **0464** Optimizing lures for surveillance of non-native wood boring beetles (Cerambycidae) in traps: Interactions among pheromones. **Jon Sweeney** (jsweeney@nrcan.gc.ca)¹, Peter Silk¹, Peter Mayo¹, Jerzy Gutowski², Daniel Miller³, Li Yan⁴, Qingfan Meng⁴, Cory Hughes¹, Kate Van Rooyen¹ and Davide Rassati⁵, ¹Natural Resources Canada, Fredericton, NB, Canada, ²Forest Research Institute, Bialowieza, Poland, ³USDA - Forest Service, Athens, GA, ⁴Beihua Univ., Jilin City, China, ⁵Univ. of Padova, Padova, Italy

1:50 **0465** Rapid assessment of longicorn beetle communities in Eastern European traditionally-maintained landscapes. **Bekka Brodie** (brodieb@ohio.edu)¹, D. Popescu¹, Ruben Iosif², Cristiana Ciocaneac³, Steluta Manolache^{3,4}, Gabriel Vanauc³, Athanasios Gavrilidis³, Rodica Serafime⁵ and Laurentiu Rozylowicz³, ¹Ohio Univ., Athens, OH, ²Univ. Ovidius Constanta, Constanta, Romania, ³Univ. of Bucharest, Bucharest, Romania, ⁴Association for Biodiversity Conservation, Focsani, Romania, ⁵Romanian Natural History Museum 'Grigore Antipa', Bucharest, Romania

2:05 **0466** The cryptic chemical ecology of the Asian longhorn beetle: Pheromonally active oxidation products of female contact pheromones. **Damon Crook** (damon.j.crook@aphis.usda.gov)¹, Jacob D. Wickham², Lili Ren³, Allard Cossé¹, Melissa Warden¹ and Tappey H. Jones⁴, ¹USDA - APHIS, Buzzards Bay, MA, ²Chinese Academy of Sciences, Beijing, China, ³Beijing Forestry Univ., Beijing, China, ⁴Virginia Military Institute, Lexington, VA

2:20 **0467** Identification of aggregation-sex pheromone components for a "living fossil", the false click beetle, *Palaeoxenus dohri* Horn (Coleoptera: Eucnemidae). **Jacqueline Serrano** (jserr005@ucr.edu), J. Steven McElfresh, Yunfan Zou and Jocelyn G. Millar, Univ. of California, Riverside, CA

2:35 Break

2:50 **0468** Monochamol, ascarosides, synergists, repellents, and CO₂: A tale of signaling molecules explains the success of the pinewood nematode and *Monochamus* symbiosis. **Jacob Wickham** (jacobwickham@ioz.ac.cn)¹, Lilin Zhao¹, Yixia Wu², Faheem Ahmad³, Jiantian Fan⁴, Longwa Zhang⁵, Jianghua Sun¹, Lawrence M. Hanks⁶ and Jocelyn Millar⁷, ¹Chinese Academy of Sciences, Beijing, China, ²State Key Laboratory of Pest Insects and Rodents, Beijing, China, ³COMSATS Institute of Information Technology, Islamabad, Pakistan, ⁴Zhejiang A&F Univ., Hangzhou, China, ⁵Anhui Agricultural Univ., Hefei, China, ⁶Univ. of Illinois, Champaign, IL, ⁷Univ. of California, Riverside, CA

3:05 **0469** Semiochemical lures and repellents of invasive *Euwallacea ambrosia* beetles in southern California. **Christine Dodge** (cdodg001@ucr.edu)¹, Miriam Cooperband², Allard Cossé², Daniel Carrillo³ and Richard Stouthamer¹, ¹Univ. of California, Riverside, CA, ²USDA - APHIS, Buzzards Bay, MA, ³Univ. of Florida, Homestead, FL

3:20 **0470** Identification of a male-produced aggregation-sex pheromone for *Phymatodes dimidiatus* (Coleoptera: Cerambycidae) and evidence of field attraction to synthetic pheromones for other *Phymatodes* species. **Claudia D. Lyons-Yerion** (yeri5309@vandals.uidaho.edu)¹, James D. Barbour², Lawrence M. Hanks³, Judy A. Mongold-Diers³, Jocelyn G. Millar⁴, Christopher J. Williams¹ and Stephen P. Cook¹, ¹Univ. of Idaho, Moscow, ID, ²Univ. of Idaho, Parma, ID, ³Univ. of Illinois, Champaign, IL, ⁴Univ. of California, Riverside, CA

3:35 **0471** Fungal volatiles: An enhanced management tool for bark and ambrosia beetles in hardwood systems. **Matthew W. Ethington** (methingt@purdue.edu) and Matthew Ginzel, Purdue Univ., West Lafayette, IN

3:50 Intermission

4:05 **0472** Evaluation of traps and attractants for emerald ash borer, *Agrilus planipennis* (Coleoptera: Buprestidae). **Therese Poland** (tpoland@fs.fed.us)¹, Toby R. Petrice¹ and Deborah McCullough², ¹USDA - Forest Service, Lansing, MI, ²Michigan State Univ., East Lansing, MI

4:20 **0473** Response by natural enemies to eggs and pheromones of the cerambycid *Xylotrechus colonus* (Cerambycinae: Clytini) in field bioassays. **Todd D. Johnson** (tdjohns2@illinois.edu), Brandon Rice and Lawrence M. Hanks, Univ. of Illinois, Champaign, IL

4:35 **0474** Global patterns in pheromone chemistry of cerambycid beetles and implications for invasion biology. **Lawrence M. Hanks** (hanks@life.illinois.edu)¹ and Jocelyn Millar², ¹Univ. of Illinois, Champaign, IL, ²Univ. of California, Riverside, CA

5:05 Concluding remarks

Member Symposium: Space, Time, and Disease: Vectors Across Multiple Spatial and Temporal Scales

Room 276 (America's Center)

Moderator and Organizer: Katie Westby, Washington Univ., Eureka, MO

1:30 Introductory remarks

1:35 **0475** Biotic interactions prevent the Asian tiger mosquito from thriving in forested habitat. **Katie Costanzo** (costanz4@canisius.edu)¹, Katie Westby² and Kim Medley², ¹Canisius College, Buffalo, NY, ²Washington Univ., Eureka, MO

1:50 **0476** Spatio-temporal mechanisms of coexistence between urban mosquitoes in Baltimore, Maryland. **Paul T. Leisnham** (leisnham@umd.edu)¹, Megan Saunders¹, Shannon LaDeau², Dawn Biehler³, Rebecca Jordan⁴ and Sacoby Wilson¹, ¹Univ. of Maryland, College Park, MD, ²Cary Institute of Ecosystem Studies, Millbrook, NY, ³Univ. of Maryland, Catonsville, MD, ⁴Michigan State Univ., East Lansing, MI

2:05 **0477** Socio-economics and the heterogenous 'riskscape' of mosquito exposure in cities. **Shannon LaDeau** (ladeaus@caryinstitute.org)¹, Dawn Biehler², Paul T. Leisnham³, Rebecca Jordan⁴ and Sacoby Wilson³, ¹Cary Institute of Ecosystem Studies, Millbrook, NY, ²Univ. of Maryland, Catonsville, MD, ³Univ. of Maryland, College Park, MD, ⁴Michigan State Univ., East Lansing, MI

Oral Presentations

2:20 **0478** Spatial correlation of *Aedes aegypti*, mosquito diversity, and socio-economics in San Juan, Puerto Rico. **Nicole Scavo** (nicole.scavo@usm.edu), Nicole Mackey and Donald Yee, The Univ. of Southern Mississippi, Hattiesburg, MS

2:35 **0479** Multi-scale modeling of *Aedes aegypti*, *Aedes albopictus* and other vector mosquito distributions. **Michael Reiskind** (mhreiski@ncsu.edu)¹, Kristen Hopperstad¹ and Mohamed Sallam², ¹North Carolina State Univ., Raleigh, NC, ²Navy Entomology Center of Excellence, Jacksonville, FL

2:50 **0480** Assessing ultra-fine scale factors to improve
human West Nile virus disease models. **Johnny Uelmen** (uelmen@
illinois.edu)¹, Surendra Karki¹, Andrew Mackay², Chris Stone², Patrick
Irwin³, Megan Fritz⁴, William Brown¹ and Rebecca Smith¹, ¹Univ. of
Illinois, Champaign, IL, ²Illinois Natural History Survey, Champaign,
IL, ³Northwest Mosquito Abatement District, Wheeling, IL, ⁴Univ. of
Maryland, College Park, MD

3:05 **0481** Temperature drives patterns of mosquito-borne disease: Transmission models and empirical evidence across 16 systems. **Marta Shocket** (mshocket@stanford.edu)^{1,2}, Leah Johnson³, Sadie Ryan⁴ and Erin Mordecai², ¹Univ. of California, Los Angeles, CA, ²Stanford Univ., Stanford, CA, ³Virginia Polytechnic Institute and State Univ., Blacksburg, VA, ⁴Univ. of Florida, Gainesville, FL

3:20 Break

3:35 **0482** Spatial scale affects inferences about tick ecology and management. **Solny Adalsteinsson** (solny.adalsteinsson@wustl.edu), Washington Univ., Eureka, MO

3:50 **0483** Challenges in pairing fine-scale land cover data with county-level observations of *Ixodes scapularis*. **Fikriyah Winata** (fwinata2@illinois.edu) and Rebecca Smith, Univ. of Illinois Champaign, IL

4:05 **0484** Patterns and mechanisms of the geographic range expansion of the blacklegged tick and Lyme disease in the Midwestern U.S. **Allison Gardner** (allison.gardner@maine.edu), Univ. of Maine, Orono, ME

4:20 **0485** Integrating genetic and environmental data to model and forecast movement and habitat use in the major insect vector of sleeping sickness in Uganda (*Glossina fuscipes fuscipes*). **Norah Saarman** (norah.saarman@yale.edu)¹, Evlyn Pless¹, Giuseppe Amatilli² and Adalgisa Caccione¹, ¹Yale Univ., New Haven, CT, ²Yale School of Forestry and Environmental Studies, New Haven, CT

4:35 **0486** Daily activity patterns of movement and refuge use in *Triatoma gerstaeckeri*, vectors of the Chagas disease parasite
Jillian Wormington (jwormington@cvm.tamu.edu), Cassidy Gillum, Alyssa Meyers, Gabriel Hamer and Sarah Hamer, Texas A&M Univ., College Station, TX

4:50 **0487** Do you know your enemy? Local adaptation of *Aedes* to *Ascogregarina* parasites. **Kristina McIntire** (kmmcnt@ilstu.edu), Steven Juliano and Lauren Prader, Illinois State Univ., Normal, IL

5:05 **0488** Living on the edge: Rapid local adaptation at the northern range limit for an invasive mosquito. **Kim Medley** (kim.medley@wustl.edu)¹, Katie Westby¹ and David Jenkins², ¹Washington Univ. Eureka, MO, ²Univ. of Central Florida, Orlando, FL

Member Symposium: *Spodoptera frugiperda* in Africa and Asia: Potential for Novel IPM

Room 260 (America's Center)

Moderators and Organizers: Aziz Ajlan¹, Khalid Alhudaib², Muhammad Haseeb³ and J. R. Faleiro⁴, ¹King Faisal Univ., Jeddah, Saudi Arabia, ²King Faisal Univ., Hofuf, Saudi Arabia, ³Florida A&M Univ., Tallahassee, FL, ⁴Independent Red Palm Weevil Consultant, Goa, India

1:30 Welcoming remarks

1:35 **0489** Opportunity for biological control and habitat management as strategies to control populations of *Spodoptera frugiperda* in the eastern hemisphere. **Robert L. Meagher** (rob.meagher@ars.usda.gov), USDA - ARS, Gainesville, FL

1:50 **0490** New invasion of the fall armyworm, *Spodoptera frugiperda* (Noctuidae: Lepidoptera), and current pest management practices in China. Zhengying Wang¹ and **Runzhi Zhang** (zhangrz@ioz.ac.cn)², ¹Chinese Academy of Agricultural Sciences, Beijing, China, ²Chinese Academy of Sciences, Beijing, China

2:05 **0491** What genetic comparisons of fall armyworm from Africa, India, and Asia indicate about migration and invasive population behaviors. **Rodney N. Nagoshi** (rodney.nagoshi@ars.usda.gov), USDA - ARS, Gainesville, FL

2:20 **0492** Push-pull farming system controls *Spodoptera frugiperda* in Africa: A lesson for Asia. **Zeyaur Khan** (zeyaurkhan@gmail.com) and Charles Midega, International Centre of Insect Physiology and Ecology (icipe), Nairobi, Kenya

2:35 **0493** The status of fall armyworm spread, awareness and its management in Asia with respect to biocontrol. Malvika Chaudhary¹ and **Vinod Pandit** (v.pandit@cabi.org)², ¹Plantwise Asia, New Delhi, India, ²CABI, New Dehli, India

2:50 Break and Poster Session

SD0494 Integration of two predaceous stinkbugs and a larval parasitoid to manage fall armyworm *Spodoptera frugiperda* (Lepidoptera: Noctuidae), an economically important pest insect of corn in Florida. **Jermaine Perier** (jermaine1.perier@famu.edu) Muhammad Haseeb¹, Jesusa C. Legaspi² and Lambert Kanga¹, ¹Florida A&M Univ., Tallahassee, FL, ²USDA - ARS, Tallahassee, FL

SD0495 Using silicon to improve biological control of the fall armyworm on corn. **Kennedy Zimba** (zimbakj@gmail.com)¹, Jesusa C. Legaspi² and Muhammad Haseeb³, ¹Univ. of Zambia, Lusaka, Zambia, ²USDA - ARS, Tallahassee, FL, ³Florida A&M Univ., Tallahassee, FL

3:05 **SP0496** The fall armyworm uses plant defenses for its own benefit. Duncan Brown and **Ivan Hiltbold** (hiltbold@udel.edu), Univ. of Delaware, Newark, DE

3:15 **SP0497** Comparative susceptibility of invasive fall armyworm populations in South Africa to Bt proteins and Bt corn plant. **Jianzhou Zhao** (joe.zhao@corteva.com)¹, Amit Sethi¹, Timothy M. Nowatzki¹, Ashley Miles¹, Benchie Ortegon¹, Jared Ostrem¹, Lu Liu¹, Marlene Van Rooyen², Jeanne Rudman², S. B. Coetzee², Tamlyn Ishizuka³ and Josemar Foresti⁴, ¹Corteva Agriscience, Johnston, IA, ²Corteva Agriscience, Delmas, South Africa, ³Corteva Agriscience, Mogi Mirim, Brazil, ⁴Corteva Agriscience, Toledo, Brazil

Oral Presentations

3:25 **SP0498** Effectiveness of insecticides to control fall armyworm (*Spodoptera frugiperda*) in the south of Puerto Rico. David Mota-Sanchez¹, Omar Posos¹, Caydee Savinelli², Jaime Sanchez³, Pascual Ramos³ and **Henry Teran Santofimio** (henry.teransantofimio@corteva.com)³, ¹Michigan State Univ., East Lansing, MI, ²Syngenta Plant Protection, Greensboro, NC, ³Corteva Agriscience, Salinas, PR

3:35 **0499** Implementation of IPM training program on the fall armyworm, *Spodoptera frugiperda* (Lepidoptera: Noctuidae), in Africa. **Muhammad Haseeb** (muhammad.haseeb@famu.edu)¹, Lambert Kanga¹, Jesusa C. Legaspi², Rodney N. Nagoshi³ and Robert L. Meagher³, ¹Florida A&M Univ., Tallahassee, FL, ²USDA - ARS, Tallahassee, FL, ³USDA - ARS, Gainesville, FL

3:50 Concluding remarks

Member Symposium: The Show-Me State: Current Entomological Research and Conservation in Missouri

Room 122 (America's Center)

Moderator and Organizer: Reese Worthington, Missouri Dept. of Conservation, Kirksville, MO

1:30 Introductory remarks

1:35 **0500** Reintroduction of the American burying beetle, *Nicrophorus americanus*, in Missouri. **Steve Buback** (steve.buback@mdc.mo.gov)¹, Bob Merz² and Andrea Schuhmann³, ¹Missouri Dept. of Conservation, St. Joseph, MO, ²Saint Louis Zoo, St. Louis, MO, ³Colorado Natural Heritage Program, Fort Collins, CO

1:50 **0501** The influence of dominant ground cover on foraging ant richness and abundance in a sand hill prairie. **Angela Peirce** (adpeirce1s@semo.edu)¹ and Diane Wood², ¹Cape Girardeau Conservation Nature Center, Cape Girardeau, MO, ²Southeast Missouri State Univ., Cape Girardeau, MO

2:05 **0502** Application of invertebrate community data to a comprehensive, statewide stream health monitoring program in Missouri. **Brett Landwer** (brett.landwer@mdc.mo.gov), Missouri Dept. of Conservation, Kirksville, MO

2:20 **0503** Population genetics and history of the endangered Hine's emerald dragonfly (*Somatochlora hineana*) in Missouri. **Meredith Mahoney** (meredith.mahoney@illinois.gov), Illinois State Museum, Springfield, IL

2:35 **0504** A survey of regal fritillary (*Speyeria idalia*) on select southwest and west Missouri prairies. **Chris Newbold** (chris.newbold@mdc.mo.gov)¹, Steve Buback² and Jerod Huebner³, ¹Missouri Dept. of Conservation, Columbia, MO, ²Missouri Dept. of Conservation, St. Joseph, MO, ³Missouri Prairie Foundation, Columbia, MO

2:50 **0505** Progress towards documenting the ant fauna (Hymenoptera: Formicidae) of Missouri. **James Trager** (james.trager@gmail.com), Shaw Nature Reserve, Gray Summit, MO

3:05 Break

3:20 **0506** The blister beetles of Missouri. **Daniel Marschalek** (danmarschalek@ucmo.edu), Univ. of Central Missouri, Warrensburg, MO

3:35 **0507** Macroinvertebrate bioassessment methodology in wadeable Missouri streams. **Rachel Heth** (rachel.heth@dnr.mo.gov), Missouri Dept. of Natural Resources, Jefferson City, MO

3:50 **0508** Learnings from 20 years of chasing tiger beetles in Missouri. **Christopher Brown** (christopher.brown1@bayer.com) and Ted MacRae, Bayer Crop Science, Wildwood, MO

4:05 **0509** Caddisfly (Insecta: Trichoptera) diversity at three national parks located in the transitional zone of the Ozarks and tallgrass prairie of Arkansas and Missouri. **David Bowles** (david_bowles@nps.gov), US National Park Service, Republic, MO

4:20 **0510** Contributions to species status and range dynamics from a statewide stream health monitoring program. **Seth Lanning** (seth.lanning@mdc.mo.gov), Missouri Dept. of Conservation, Columbia, MO

4:35 **0511** Riparian effects on odonate assemblages in Ozark spring streams. **Cameron Cheri** (cam20@missouristate.edu) and Deb Finn, Missouri State Univ., Springfield, MO

4:50 **0512** Hydrochidae of Missouri. **Reese Worthington** (reese.worthington@mdc.mo.gov), Missouri Dept. of Conservation, Kirksville, MO

5:05 Concluding remarks

Organized Meeting: International Society of Hymenopterists Symposium and Business Meeting

Room 130 (America's Center)

Moderators and Organizers: Natalie Dale-Skey¹ and Barbara Sharadowski², ¹Natural History Museum, London, United Kingdom, ²Univ. of Central Florida, Orlando, FL

1:30 Welcoming remarks

1:35 **0513** Phylogenomics of Platygastroidea (Hymenoptera: Proctotrupomorpha). **Zachary Lahey** (lahey.18@osu.edu), The Ohio State Univ., Columbus, OH

1:47 **0514** Building a diagnostic framework for the genus *Synopeas* Förster (Platygastriidae: Platygastriinae) using reared specimens from Papua New Guinea. **Jessica Awad** (jessica.awad@ufl.edu)¹, Elijah Talamas², Amanda Hodges¹ and Ronald Cave³, ¹Univ. of Florida, Gainesville, FL, ²Florida Dept. of Agriculture and Consumer Services, Gainesville, FL, ³Univ. of Florida, Fort Pierce, FL

1:59 **0515** *Schwarzia* – Overlooked diversity in an Eastern African lineage of cleptoparasitic bees. **Silas Bossert** (sb2346@cornell.edu)^{1,2}, Robert Copeland^{2,3} and Seán Brady², ¹Cornell Univ., Ithaca, NY, ²Smithsonian Institution, National Museum of Natural History, Washington, DC, ³International Centre of Insect Physiology and Ecology (icipe), Nairobi, Kenya

2:11 **0516** Taxonomic revision of the Leptanillinae (Hymenoptera: Formicidae) based on morphological and genomic data: Preliminary results. **Zachary Griebenow** (zgriebenow@ucdavis.edu)¹, Georg Fischer² and Evan Economo², ¹Univ. of California, Davis, CA, ²Okinawa Institute of Science and Technology, Okinawa, Japan

2:23 **0517** Global domination by crazy ants: Ultraconserved elements reveal biogeographic history and invasive species relationships in the genus *Nylanderia* (Hymenoptera, Formicidae). **Jason Williams** (jwilli81@ufl.edu)¹, Miles Zhang¹, Michael Lloyd², John S. LaPolla³, Ted Schultz² and Andrea Lucky¹, ¹Univ. of Florida, Gainesville, FL, ²Smithsonian Institution, Washington, DC, ³Towson Univ., Towson, MD

Oral Presentations

<p>2:35 SP0518 Updates on cynipoid research at the National Museum of Natural History. Matt Buffington (matt.buffington@ars.usda.gov)¹, Bonnie Blaimer², Séan Brady³, Chang-Ti Tang⁴, Chia-Hua Lue⁵, Mattias Forshage⁶, Simon van Noort⁷ and Kim Hoelmer⁸, ¹USDA - ARS, Washington, DC, ²North Carolina State Univ., Raleigh, NC, ³Smithsonian Institution, National Museum of Natural History, Washington, DC, ⁴George Washington Univ., Washington, DC, ⁵Czech Academy of Science, Branisovska, Czech Republic, ⁶Swedish Museum of Natural History, Stockholm, Sweden, ⁷Iziko South African Museum, Cape Town, South Africa, ⁸USDA - ARS, Newark, DE</p> <p>2:45 SP0519 Phylogeny and systematics of the trash can oak gallwasp genus <i>Dryocosmus</i> (Hymenoptera: Cynipidae: Cynipini) galling on multiple host-plants. Chang-Ti Tang (cynipidsman@gmail.com)¹, Matt Buffington², Michael Gates², John Lill¹, James Nicholls³, George Melika⁴, Man-Miao Yang⁵, Carol Mapes⁶ and Graham Stone⁷, ¹George Washington Univ., Washington, DC, ²USDA - ARS, Washington, DC, ³CSIRO, Acton, ACT, Australia, ⁴National Food Chain Safety Office, Budapest, Hungary, ⁵National Chung Hsing Univ., Taichung, Taiwan, ⁶Kutztown Univ. of Pennsylvania, Kutztown, PA, ⁷Univ. of Edinburgh, Edinburgh, United Kingdom</p> <p>2:55 Break</p> <p>3:05 ISH business meeting</p> <p>4:35 ISH social</p>	<p>2:50 Break</p> <p>3:05 0525 Evolutionary significance of oviposition techniques in stick and leaf insects (Phasmatodea). James A. Robertson (james.a.robertson@aphis.usda.gov)¹, Sven Bradler² and Michael F. Whiting³, ¹USDA - APHIS, Beltsville, MD, ²Georg-August-Univ., Göttingen, Germany, ³Brigham Young Univ., Provo, UT</p> <p>3:20 0526 Morph formation in the wing polyphenic sand cricket, <i>Gryllus firmus</i>. Abigail Hayes (abigail.hayes@wsu.edu) and Laura Lavine, Washington State Univ., Pullman, WA</p> <p>3:35 0527 Examining the effects of biopesticides on the nutritional physiology of <i>Melanoplus sanguinipes</i>, a rangeland grasshopper. Deanna Zembrzuski (dzembrzu@asu.edu)¹, Dustin Grief¹, Rick Overson¹, Derek Woller² and Arianne Cease¹, ¹Arizona State Univ., Tempe, AZ, ²USDA - APHIS, Phoenix, AZ</p> <p>3:50 0528 Sexual selection and alternative mating strategies in Wellington tree weta. Clint Kelly (clintdkelly@icloud.com), Univ. du Québec, Montréal, QC, Canada</p> <p>4:20 Discussion</p>
<h3>Organized Meeting: SOLA Scarab Workers</h3>	
<i>Room 127 (America's Center)</i>	
Moderators and Organizers: Andrew B. T. Smith ¹ and Nicole Gunter ² , ¹ Canadian Museum of Nature, Ottawa, ON, Canada, ² Cleveland Museum of Natural History, Cleveland, OH	
<p>1:30 Introductory remarks</p> <p>1:35 0529 Scarabs intercepted by APHIS at US ports of entry. Eugenio Nearns (eugenio.h.nearns@aphis.usda.gov), USDA - APHIS, Washington, DC</p> <p>1:55 0530 The current state of knowledge on Australian Scarabaeoidea. Nicole Gunter (ngunter@cmnh.org), Cleveland Museum of Natural History, Cleveland, OH</p> <p>2:15 0531 Presentation withdrawn</p> <p>2:35 0532 Phylogeny and diversification patterns of the new world bess beetles (Coleoptera: Passalidae). Cristian Beza (cfbeza@memphis.edu), Univ. of Memphis, Memphis, TN</p> <p>2:55 0533 Unveiling the factors behind the diversification of dung beetles (Scarabaeinae). Orlando Schwery (oschwery@vols.utk.edu), Univ. of Tennessee, Knoxville, TN</p> <p>3:15 Break</p> <p>3:35 0534 Presentation withdrawn</p> <p>3:55 0535 Behavioral plasticity and invasiveness in <i>Onthophagus</i> spp. Margaret Mamantov (mmamanto@vols.utk.edu) and Kimberly Sheldon, Univ. of Tennessee, Knoxville, TN</p> <p>4:15 0536 Dung beetle (Coleoptera: Scarabaeidae) diversity in North America with a focus on open and forested pasture in southern Alberta. Giselle Bezanson (giselle.bezanson@uleth.ca), Univ. of Lethbridge, Lethbridge, AB, Canada</p> <p>4:35 0537 Presentation withdrawn</p> <p>4:55 Discussion</p>	

Oral Presentations

10-min: PBT, Physiology

Room 280 (America's Center)

Moderator: Julian F. Hillyer, Vanderbilt Univ., Nashville, TN

1:30 **0538** Fabrication of multifunctional engineered materials inspired by insect wing surfaces. Junho Oh¹, Catherine Dana¹, Julian Reed², Nenad Miljkovic¹, Donald Cropek² and **Marianne Alleyne** (vanlaarh@illinois.edu)¹, ¹Univ. of Illinois, Champaign, IL, ²US Army Engineer Research and Development Center, Champaign, IL

1:40 **0539** Proneness and immune defense mechanism of sawtoothed grain beetle, *Oryzaephilus surinamensis* L. (Coleoptera: Silvanidae), against infections caused by entomopathogenic fungi. **Farid Shaheen** (shaheen@uaar.edu.pk), Pir Mehr Ali Shah Arid Agriculture Univ., Rawalpindi, Pakistan

1:50 **0540** Mosquito heart physiology is altered by a bacterial infection. **Julian F. Hillyer** (julian.hillyer@vanderbilt.edu) and Tania Y. Estevez-Lao, Vanderbilt Univ., Nashville, TN

2:00 **0541** Adult body size affects the host-seeking behavior of female mosquitoes. **Karthikeyan Chandrasegaran** (karthikeyan@vt.edu) and Clement Vinauger, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

2:10 **0542** Presentation withdrawn

2:20 **0543** Aquatic insects and water quality parameters as indicator of water quality in Aahoo Stream, south-western Nigeria. **Babasola Adu** (williamsadubabs@yahoo.com)¹ and Ismaila Aderolu², ¹The Federal Univ. of Technology, Akure, Nigeria, ²Kwara State Univ., Ilorin, Nigeria

2:30 **0544** High population density induces wing formation in aphid through insulin signaling pathway. **Feng Shang** (fengshang1994@yahoo.com), Jin-zhi Niu, Bi-yue Ding and Jin-Jun Wang, Southwest Univ., Chongqing, China

2:40 Break

2:50 **0545** Presentation withdrawn

3:00 **0546** Is juvenile hormone involved in reproduction and lifespan extreme trade-off in the citrus mealybug *Planococcus citri*? **Isabelle Vea** (isabelle.vea@gmail.com)^{1,2}, David Wu², Hannah Lemon² and Laura Ross², ¹Univ. of Illinois, Chicago, IL, ²Univ. of Edinburgh, Edinburgh, United Kingdom

3:10 **0547** Different patterns of Hessian fly-effector localization in wheat tissue during compatible and incompatible interactions. **Zainab AlJbory** (aliz@ksu.edu)¹, Yoonseong Park¹ and Ming-Shun Chen^{1,2}, ¹Kansas State Univ., Manhattan, KS, ²USDA - ARS, Manhattan, KS

3:20 **0548** Influence of *Bemisia tabaci* attack on soybean protein content. **Inana Schutze** (inana.schutze@usp.br), Paulo Mazzafera and Pedro Yamamoto, Univ. de São Paulo, Piracicaba, Brazil

3:30 **0549** Effects of transit temperature on citrus export concern pests. **Sandipa Gautam** (sangautam@ucanr.edu)¹, Elizabeth Grafton-Cardwell¹, Yuling Ouyang², Ping Gu¹ and Spencer Walse³, ¹Univ. of California, Riverside, CA, ²Univ. of California, Parlier, CA, ³USDA - ARS, Parlier, CA

3:40 **0550** Disruption of the osmotic homeostasis in the Asian citrus psyllid, *Diaphorina citri*, using RNA interference. **Yulica Santos Ortega** (yulica.santosort@ufl.edu) and Nabil Killiny, Univ. of Florida, Lake Alfred, FL

3:50 **0551** Daily foraging activity and circadian rhythms of a guild of three carpenter bee species on Vitex. **Carlos Ortiz-Alvarado** (cortiz3515@gmail.com)¹, Tugrul Giray² and Jose Agosto-Rivera², ¹Univ. de Puerto Rico, San Juan, PR, ²Univ. of Puerto Rico, San Juan, PR

4:00 Break

4:10 **0552** Meal ingestion into the midgut of *Aedes aegypti* mosquito leads to ultrastructural and proteomic changes in the tissue facilitating arbovirus dissemination. **Yingjun Cui** (cuiyingj@missouri.edu), Pei Liu, DeAna Grant, Jinyin Lin, Alexander Jurkovich, Brian Mooney and Alexander Franz, Univ. of Missouri, Columbia, MO

4:20 **0553** Macronutrient preferences in ant communities across the Americas. **Pierre Lesne** (pierre.lesne@tamu.edu) and Spence Behmer, Texas A&M Univ., College Station, TX

4:30 **0554** Diversification and conservation of social signals in the cuticular hydrocarbon profile of *Odontomachus* ants. **Adrian A. Smith** (adrian.smith@naturalsciences.org), North Carolina Museum of Natural Sciences, Raleigh, NC

4:40 **0555** Outbreeding locusts (*Schistocerca cancellata*) in Paraguay prefer and perform best on high carbohydrate diets that are rare in their habitat. **Stav Talal** (stav.talal@gmail.com), Jacob Youngblood, Ruth Farington, Arianne Cease and Jon Harrison, Arizona State Univ., Tempe, AZ

4:50 **0556** The establishment risk of *Lycorma delicatula* (Hemiptera: Fulgoridae) globally and in the United States, with focus on the Pacific Northwest. **Tewodros Wakie** (tewodros.wakie@ars.usda.gov), Lisa Neven and Wee Yee, USDA - ARS, Wapato, WA

5:00 **0557** Red palm weevil, *Rhynchophorus ferrugineus* (Olivier), management: Is it working? **Abdulrahman Aldawood** (aldawood@ksu.edu.sa), Khawaja Rasool and Mureed Husain, King Saud Univ., Riyadh, Saudi Arabia

5:10 **0558** Turn harmful grubs into a promising insect food resource—evaluation of grub pulp muffin on nutrition and spore-forming bacteria. **Qizhi Liu** (lqzzyx126@126.com) and Shengjie Xu, China Agricultural Univ., Beijing, China

10-min: P-IE, Behavior and Apiculture

Room 265 (America's Center)

Moderators: H. Alejandro Arevalo¹ and Eugene Ryabov², ¹BASF Corporation, Research Triangle Park, NC, ²USDA - ARS, Beltsville, MD

1:30 **0559** Presentation withdrawn

1:40 **0560** Monitoring the performance of *Imbrasia forda* and *Gonimbrasia belina* feeding on *Sclerocarya birrea* leaves and defoliation rate at the northern coastal region of KwaZulu-Natal, South Africa. **Brian Fakazi** (fakazi322@gmail.com), Godfrey Zharare and Fabian Fon, Univ. of Zululand, Kwadlangezwa, South Africa

1:50 **0561** Patch selection by bumble bees. **Fabiana Fragoso** (palmeirafrag@wisc.edu)^{1,2}, Qi Jiang¹, Murray Clayton¹ and Johanne Brunet³, ¹Univ. of Wisconsin, Madison, WI, ²Oak Ridge Institute for Science and Education, Madison, WI, ³USDA - ARS, Madison, WI

2:00 **0562** Nesting habitat preference of indigenous bumblebee, *Bombus haemorrhooidalis*, in the Himalayan range of Azad Jammu and Kashmir, Pakistan. **Junaid Rahim** (junaidrahim47@yahoo.com), Umer Ayaz Sheikh and Muhammad Imran, Univ. of The Poondi, Rawalakot, Pakistan

Oral Presentations

2:10 **0563** Can the cycle of rising Varroa and virus levels due to mite migration be broken by improving nutrition in honey bee colonies? **Gloria DeGrandi-Hoffman** (gloria.hoffman@ars.usda.gov)¹, Vanessa Corby-Harris¹, Yanping Chen², Henry Graham¹, Mona Chambers³, Emily Watkins deJong³, Nicholas Ziolkowski¹ and Meg Deeter¹, ¹USDA - ARS, Tucson, AZ, ²USDA - ARS, Beltsville, MD, ³Carl Hayden Bee Research Center, Tucson, AZ

2:20 **0564** Effects of combined pesticide exposure on honey bee health and behavior. **Sebastian Shepherd** (shephe24@purdue.edu) and Christian Krupke, Purdue Univ., West Lafayette, IN

2:30 **0565** European honey bees avoid predaceous ants used for biocontrol. **Shannon Murphy** (shannon.m.murphy@du.edu)¹ and Lori Lach², ¹Univ. of Denver, Denver, CO, ²James Cook Univ., Cairns, QLD, Australia

2:40 **0566** Examining factors that affect the health of Africanized honey bee populations in Latin America. A case study: Cauca, Colombia. **Ulianova Vidal Gomez** (ulianova.vidal@fraunhofer.cl)^{1,2}, Maria Sanchez Chaparral², Blanca Bonilla², Bibiana Montoya Bonilla², Leslie Vallejos Farias¹, Marnix Doorn¹ and Mayda Verde Jimenez¹, ¹Fraunhofer Chile Research, Santiago, Chile, ²Corporacion Universitaria Comfacaqua, Popayan, Colombia

2:50 **0567** Impact of almond insecticides, fungicides, and phytochemicals on behavioral responses of nurse honey bees. **Ling-Hsiu Liao** (liao19@illinois.edu), Daniel Pearlstein and May Berenbaum, Univ. of Illinois, Champaign, IL

3:00 **0568** Deformed wing virus type A, a major honey bee pathogen, is vectored by the mite *Varroa destructor* in a non-propagative manner. **Eugene Ryabov** (eugene.ryabov@gmail.com), Francisco Posada-Florez, Anna Childers, Matthew Heerman, Steven Cook, Noble Egekuwu, Yanping Chen and Jay Evans, USDA - ARS, Beltsville, MD

10-min: P-IE, Biocontrol, General and Predators

Room 232 (America's Center)

Moderators: Nastaran Tofangsazi¹ and Luis Burzio², ¹Univ. of California, Davis, CA, ²Bayer Crop Science, Chesterfield, MO

1:30 **0569** Herbivorous arthropods associated with *Taeniatherum caput-medusae* and host range testing of *Aculodes altamurgiensi*, a candidate for its biological control. **Nastaran Tofangsazi** (nastaran.tofangsazi@ars.usda.gov)¹, Paul Pratt², Brian G. Rector³ and Kirk C. Tonkel³, ¹Univ. of California, Davis, CA, ²USDA - ARS, Albany, CA, ³USDA - ARS, Reno, NV

1:40 **0570** Life cycle of the spinach moth, *Hymenia recurvalis* (Lepidoptera: Pyralidae), on purple amaranth, *Amaranthus blitum*, in Southwest Nigeria. **Ismaila Aderolu** (adeisma@yahoo.com)¹, Adebayo Omoloye² and Adegoke Oyedokun³, ¹Kwara State Univ., Ilorin, Nigeria, ²Univ. of Ibadan, Ibadan, Nigeria, ³Cocoa Research Institute of Nigeria, Ibadan, Nigeria

1:50 **0571** Three prospective agents instead of one? Cryptic diversity of the biological control agent *Psylliodes chalcomera*. Alessio De Biase¹, **Lincoln Smith** (link.smith@ars.usda.gov)², Matteo Brunetti¹, Silvia Belvedere¹, Simona Primerano¹, Gloria Antonini¹, Alessandra La Marca³, Paolo Audisio¹, Maurizio Biondi⁴ and Massimo Cristofaro⁵, ¹Sapienza Rome Univ., Rome, Italy, ²USDA - ARS, Albany, CA, ³Biotechnology and Biological Control Agency, Rome, Italy, ⁴Univ. of L'Aquila, L'Aquila, Italy, ⁵ENEA Casaccia Research Center, Rome, Italy

2:00 **0572** Understanding diapause induction in *Hypena opulenta*, a biological control agent for *Vincetoxicum* spp. in Canada. **Ian Jones** (ijone002@fiu.edu)¹, Sandy Smith¹ and Rob Bourchier², ¹Univ. of Toronto, Toronto, ON, Canada, ²Agriculture and Agri-Food Canada, Lethbridge, AB, Canada

2:10 **0573** Impact of *Cricotopus lebetis* on the competitive ability of *Hydrella verticillata*. **Eutychus Kariuki** (eutychus.kariuki@ufl.edu)¹, James Cuda², Raymond L. Hix³, Stephen Hight⁴ and Jennifer Gillett-Kaufman², ¹Univ. of Florida, Fort Pierce, FL, ²Univ. of Florida, Gainesville, FL, ³Florida A&M Univ., Tallahassee, FL, ⁴USDA - ARS, Tallahassee, FL

2:20 **0574** Evaluation of two different field release methods for *Parafreutreta regalis*, a biological control against invasive cape-ivy. **Scott Portman** (scott.portman@ars.usda.gov) and Patrick Moran, USDA - ARS, Albany, CA

2:30 **0575** From the heart of Asia: Foreign exploration for natural enemies of polyphagous shot hole borer (PSHB) in Taiwan. **Ricky Lara** (jlara007@ucr.edu)¹, Fang-ling Liu², Shu-Jen Tuan² and Richard Stouthamer¹, ¹Univ. of California, Riverside, CA, ²National Chung Hsing Univ., Taichung, Taiwan

2:40 **0576** Augmenting the European earwig, *Forficula auricularia*, for enhanced biological control in pear and apple orchards. **Louis Nottingham** (louis.nottingham@wsu.edu)¹, Elizabeth Beers¹, Robert Orpet¹, Richard Hilton² and Rebecca Schmidt-Jeffris³, ¹Washington State Univ., Wenatchee, WA, ²Oregon State Univ., Central Point, OR, ³USDA - ARS, Wapato, WA

2:50 Break

3:00 **0577** Developments in Argentine ant management and implications for biocontrol of citrus pests. **Kelsey McCalla** (kelseyschall@gmail.com)¹ and Mark Hoddle², ¹Univ. of California, Moreno Valley, CA, ²Univ. of California, Riverside, CA

3:10 **0578** Predation preference of *Curinus coeruleus* (Mulsant) on Florida red scale (FRS) *Chrysomphalus aonidum* (L.). **Salman Al-Shami** (salshami@ufl.edu)¹ and Jawwad Qureshi², ¹Univ. of Florida, Fort Pierce, FL, ²Univ. of Florida, Immokalee, FL

3:20 **0579** The role of birds as biological control agents and intraguild predators of insects in California Central Coast strawberries. **Karina Garcia** (karina_garcia@uky.edu)¹, Elissa Olimpi², Daniel Karp² and David Gonthier¹, ¹Univ. of Kentucky, Lexington, KY, ²Univ. of California, Davis, CA

3:30 **0580** Advances in non-nuclear tech: A modern approach to the sterile insect technique. **Brent Phelan** (bphelan@radsource.com), Rad Source Technologies, Buford, GA

3:40 **0581** Parasitism and predation of *Halyomorpha halys* in woodlands, and orchard, vineyard, row, and vegetable crops in the southeastern US. **Glynn Tillman** (glynn.tillman@ars.usda.gov)¹, Ashfaq Sial², Brett Blaauw², G. David Buntin³, Ted Cottrell⁴, Shimat Joseph³, Elijah Talamas³, Michael Toews⁵, Rammohan Rao Balusu⁷ and Katelyn Kesheimer⁷, ¹USDA - ARS, Tifton, GA, ²Univ. of Georgia, Athens, GA, ³Univ. of Georgia, Griffin, GA, ⁴USDA - ARS, Byron, GA, ⁵Florida Dept. of Agriculture and Consumer Services, Gainesville, FL, ⁶Univ. of Georgia, Tifton, GA, ⁷Auburn Univ., Auburn, AL

3:50 **0582** Macro- and micro-nutrients in tomato plant sap predict pest pressure of the greenhouse whitefly (*Trialeurodes vaporariorum*). **Tim Engelkes** (tengelkes@koppert.com), Koppert Biological Systems, Howell, MI

4:00 **0583** Evaluation of the predatory mite, *Amblyseius swirskii* (Acar: Phytoseiidae), for management of whiteflies in field-grown squash. **Deepak Shrestha** (dshrestha@ufl.edu), Marice Lopez and Oscar Liburd, Univ. of Florida, Gainesville, FL

Oral Presentations

4:10 Break

4:20 **0584** Crawlies vs creepies? Carabid and slug activity density in till and no-till annual ryegrass fields with a view to predation. **Inga Reich** (ingaimperio@gmail.com)¹, Casi Jessie¹, Michael J. Gormally² and Rory Mc Donnell¹, ¹Oregon State Univ., Corvallis, OR, ²National Univ. of Ireland, Galway, Ireland

4:30 **0585** Field management to support beneficial arthropods for IPM on vegetable farms. **Syed Rizvi** (srizvi@csu.edu.au)¹, Ahsanul Haque¹, Olivia Reynolds², Michael J. Furlong³, Jianhua Mo⁴, Jessica Page⁵ and Geoff Gurr⁶, ¹Charles Sturt Univ., Orange, NSW, Australia, ²Cesar Australia, Parkville, VIC, Australia, ³Univ. of Queensland, Brisbane, QLD, Australia, ⁴New South Wales Dept. of Primary Industries, Yanco, NSW, Australia, ⁵IPM Technologies, Hurstbridge, VIC, Australia, ⁶Fujian Agriculture and Forestry Univ., Fuzhou, China

4:40 **0586** Pupal desiccation risk of a biological control agent during a mass release strategy. **Dale Halbritter** (dale.halbritter@ars.usda.gov), Greg Wheeler and Min Rayamajhi, USDA - ARS, Fort Lauderdale, FL

4:50 **0587** Traumatic insemination in *Orius insidiosus*: Mating failures and high costs for females. **J. P. Michaud** (jpmi@ksu.edu)¹, Henry Vacacela Ajila², Ahmed Abdelwahab³, Sara Kuchta⁴ and Hannah Stowe¹, ¹Kansas State Univ., Hays, KS, ²Univ. Federal de Viçosa, Viçosa, Brazil, ³Mansoura Univ., Mansoura, Egypt, ⁴Univ. de São Paulo, Botucatu, Brazil

5:00 **0588** Predator breeding stations for augmentative biological control of coffee berry borer. Peter Follett¹ and **Darek Czokajlo** (darek@alphascents.com)², ¹USDA - ARS, Hilo, HI, ²Alpha Scents, Inc, West Linn, OR

5:10 **0589** Field evaluation of potential impacts of MON 88702 on the abundance of predatory Hemiptera in cotton. Christopher Brown, Peter Asiiimwe, Lieselot Bertho, Changjian Jiang, Adam Schapaugh and **Luis Burzio** (luis.burzio@bayer.com), Bayer Crop Science, Chesterfield, MO

10-min: P-IE, IPM, Field Crops 2

Room 264 (America's Center)

Moderators: Jarrad Prasifka¹ and Matthew VanWeelden², ¹USDA - ARS, Fargo, ND, ²Univ. of Florida, Belle Glade, FL

1:30 **0590** Fatty acid composition and crop survey data indicate sources of red sunflower seed weevil infestations and have implications for IRM. **Jarrad Prasifka** (jarrad.prasifka@ars.usda.gov) and James Anderson, USDA - ARS, Fargo, ND

1:40 **0591** From "WTH?" to IPM: Rapid management strategy development for a specialist pest in a newly domesticated crop. **Ebony Murrell** (murrell@landinstitute.org)¹, Nervah Cheremondi¹, William Morrison², Kelsey Peterson³, Jarrad Prasifka⁴, David Van Tassel¹ and Alejandra Vilela⁵, ¹The Land Institute, Salina, KS, ²USDA - ARS, Manhattan, KS, ³Univ. of Minnesota, St. Paul, MN, ⁴USDA - ARS, Fargo, ND, ⁵Museo Paleontológico Egidio Feruglio, Trelew City, Argentina

1:50 **0592** Working with "the foe": Aphid management in wheat grown from insecticide treated seeds. **Raul T. Villanueva** (raul.villanueva@uky.edu) and Zenaida Viloria, Univ. of Kentucky, Princeton, KY

2:00 **0593** Management strategies for pulse insect pest complex in Montana. **Gadi Reddy** (reddy@montana.edu)¹, Govinda Shrestha², Anamika Sharma¹ and Ramadevi Gadi¹, ¹Montana State Univ., Conrad, MT, ²Oregon State Univ., Hermiston, OR

2:10 **0594** Insect abundance on cowpea as influenced by crop geometry and time of introduction in sorghum-cowpea intercrop. **James Ojo** (jamesadebayoo@gmail.com), Ade Afe and Kafayat Ahmed, Kwara State Univ., Ilorin, Nigeria

2:20 **0595** Response of indigenous plant extracts against jassid, *Amrasca biguttula biguttula l.* (Cicadellidae: Homoptera) in okra. **Shahbaz Ahmad** (shahbaz.iags@pu.edu.pk), Univ. of the Punjab, Lahore, Pakistan

2:30 **0596** Temporal abundance and diversity of whitefly in south Georgia farmscape. **Apurba Barman** (abarman@uga.edu), Phillip Roberts, Alton N. Sparks and Michael Toews, Univ. of Georgia, Tifton, GA

2:40 **0597** Diversity and population dynamics of the Florida stink bug complex in rice and non-crop hosts. **Matthew VanWeelden** (mvanweel1@ufl.edu), Ronald H. Cherry and Michael Karounos, Univ. of Florida, Belle Glade, FL

10-min: SysEB, Diversity, Evolution, and Biology of Hemiptera

Room 124 (America's Center)

Moderators: Amanda Brown¹ and Matthew Lehnert², ¹Texas Tech Univ., Lubbock, TX, ²Kent State Univ., North Canton, OH

1:30 **0598** Species assemblage and diversity of scale insects in the USA. **Muhammad Ahmed** (muhammad.ahmed@freshfromflorida.com), Florida Dept. of Agriculture and Consumer Services, Gainesville, FL

1:40 **0599** Cicada ovipositors are enriched with cuticular metal deposits. **Matthew Lehnert** (mlehner1@kent.edu)¹, Kristen Reiter², Gregory Smith¹ and Gene Kritsky³, ¹Kent State Univ., North Canton, OH, ²Univ. of Illinois, Champaign, IL, ³Mount St. Joseph Univ., Cincinnati, OH

1:50 **0600** Sexual size dimorphism and evolutionary allometry in giant water bugs: Implications to the paternal care behavior. **Fabiano Stefanello** (stefanello@usp.br)¹, Jose Ribeiro² and Eduardo Almeida¹, ¹Univ. de São Paulo, Ribeirão Preto, Brazil, ²Univ. Federal do Pampa, São Gabriel, Brazil

2:00 **0601** Progress, after a sort, on taxonomy and diagnostics of Acanaloniidae (Hemiptera: Auchenorrhyncha: Fulgoroidea). **Charles Bartlett** (bartlett@udel.edu), Univ. of Delaware, Newark, DE

2:10 **0602** Faunal diversity of Hemiptera of Ajmer, Rajasthan, India. **Rashmi Sharma** (sharmarashmigca@gmail.com), Maharshi Dayanand Saraswati Univ., Ajmer, India

2:20 **0603** The NUMTs in the nuclear genomes of *Bemisia tabaci* (Hemiptera: Aleyrodidae) and its implications in the demarcation of molecular species. **Jorge Paredes-Montero** (jparedes@email.arizona.edu) and Judith Brown, Univ. of Arizona, Tucson, AZ

2:30 **0604** Presentation withdrawn

2:40 **0605** Planthoppers (Hemiptera: Auchenorrhyncha) associated with coconut palms in Costa Rica. **Brian Bahder** (bbahder@ufl.edu)¹, Charles Bartlett², Erica Goss³, Marina Ascunce³, Edwin Barrantes⁴ and Marco Zumbado⁴, ¹Univ. of Florida, Davie, FL, ²Univ. of Delaware, Newark, DE, ³Univ. of Florida, Gainesville, FL, ⁴Univ. of Costa Rica, San Ramon, Costa Rica

Presentations: Poster/Infographic Displays

2:50 **0606** Cryptic colorations of leafhopper pests (Hemiptera: Cicadellidae) on agricultural crops revealed by DNA barcoding. **Hwalran Choi** (hchoi4@memphis.edu)¹, Seungwan Shin¹, Duane McKenna¹ and Seunghwan Lee², ¹Univ. of Memphis, Memphis, TN, ²Seoul National Univ., Seoul, South Korea

3:00 **0607** Exceptional losses of symbionts in plant-feeding insects: Comparative genomics of the Typhlocybinae. **Amanda Brown** (amanda.mv.brown@ttu.edu)¹ and Sydney Pittignano², ¹Texas Tech Univ., Lubbock, TX, ²Greenwich Academy, Greenwich, CT

3:10 **0608** Breaking free from Hymenoptera models: In search of the truth of rescue behavior in Hemiptera. **Anthony DiMeglio** (anthony.dimeglio@slsc.org)¹, Andrew Dechaine², Thomas Kuhar² and Donald C. Weber³, ¹Saint Louis Science Center, St. Louis, MO, ²Virginia Polytechnic Institute and State Univ., Blacksburg, VA, ³USDA - ARS, Beltsville, MD

10-min: P-IE, Stored Product Pests

Room 231 (America's Center)

Moderators: Srinivas Lanka¹ and Xiangbing Yang², ¹Kansas State Univ., Manhattan, KS, ²Univ. of California, Salinas, CA

4:00 **0609** Comparative susceptibility of two dermestid species to methoprene and pyriproxyfen, and to methoprene between diapausing and non-diapausing larvae. **Srinivas Lanka** (slanka@ksu.edu)¹, Frank Arthur², James Campbell² and Kun Yan Zhu¹, ¹Kansas State Univ., Manhattan, KS, ²USDA - ARS, Manhattan, KS

4:10 **0610** Grain protectant stability in a continuous flow dryer. **Michael Toews** (mtoews@uga.edu), Univ. of Georgia, Tifton, GA

4:20 **0611** Advantages of cylinderized phosphine for stored grain protection. **Edmond L. Bonjour** (edmond.bonjour@okstate.edu), Oklahoma State Univ., Stillwater, OK

4:30 **0612** Developing an artificial intelligent system for identification of common storage beetle in food. **Hongjian Ding** (hongjian.ding@fda.hhs.gov), US Food and Drug Administration, Jefferson, AR

4:40 **0613** Nitric oxide fumigation for control of navel orange worm *Amyeloides transitella* on walnut. **Xiangbing Yang** (xbya@ucdavis.edu)¹, Yong-Biao Liu², Gregory Simmons³, Douglas Light⁴ and Ron Haff⁴, ¹Univ. of California, Salinas, CA, ²USDA - ARS, Salinas, CA, ³USDA - APHIS, Salinas, CA, ⁴USDA - ARS, Albany, CA

4:50 **0614** Presentation withdrawn

SUNDAY, NOVEMBER 17, 2019 • EVENING

Opening Plenary Session with Keynote by Erica McAlister

America's Ballroom (America's Center)

Moderator: Robert Peterson, Montana State Univ., Bozeman, MT

5:30 Introduction of Executive Committee

5:30 **0615** Introductory Remarks. **Robert Peterson** (bpeterson@montana.edu), Montana State Univ., Bozeman, MT

5:40 **0616** Presidential Address. **Robert Peterson** (bpeterson@montana.edu), Montana State Univ., Bozeman, MT

6:00 **0617** ESA Executive Director Remarks. **C. David Gammel** (dgammel@entsoc.org), Entomological Society of America, Annapolis, MD

6:10 **0618** ICE 2020 Helsinki. **Heikki Hokkanen** (heikki.hokkanen@helsinki.fi), Univ. of Helsinki, Helsinki, Finland

6:20 ESA Honorary Members and Fellows

6:40 **0619** Introduction of Plenary Keynote Presenter. **Robert Peterson** (bpeterson@montana.edu), Montana State Univ., Bozeman, MT

6:45 **0620** Keynote Presentation: "Murder, Maggots and Mayhem". **Erica McAlister** (e.mc.alister@nhm.ac.uk), Natural History Museum, London, United Kingdom

7:30 Adjourn to the Welcome Reception in the Exhibit Hall

MONDAY, NOVEMBER 18, 2019

Grad Infographic: MUVE and PBT

Exhibit Hall 1 & 2 (America's Center)

D3000 Landscape genetics of an invasive mosquito in an urban-rural landscape. **Emily Reed** (emreed@ncsu.edu), North Carolina State Univ., Raleigh, NC

D3001 Insect specific viruses in Puerto Rican *Aedes aegypti*. **Nicole Scavo** (nicole.scavo@usm.edu) and Donald Yee, The Univ. of Southern Mississippi, Hattiesburg, MS

D3002 Ticking all the boxes: Tick surveillance in Illinois through collaboration between, governmental, academic, and citizen scientists. **Lee Ann Lyons** (leelyons@illinois.edu)¹, Chris Stone², Nohra Mateus-Pinilla² and Rebecca Smith¹, ¹Univ. of Illinois, Champaign, IL, ²Illinois Natural History Survey, Champaign, IL

D3003 Going ham! Invertebrate pests of American dry-cured ham facilities. **Jacqueline Maille** (jmaille@ksu.edu)¹, Naomi Manu¹, M. Wes Schilling² and Thomas Phillips¹, ¹Kansas State Univ., Manhattan, KS, ²Mississippi State Univ., Mississippi State, MS

D3004 How to turn your home into habitat. **Nina Fogel** (nina.fogel@slu.edu) and Gerardo Camilo, Saint Louis Univ., St. Louis, MO

D3005 Nitrogen recycling in subterranean termites. **Reina Tong** (reinat@ufl.edu), Thomas Chouvenc and Nan-Yao Su, Univ. of Florida, Davie, FL

D3006 Hybrid termites of two invasive *Coptotermes* (Blattodea: Rhinotermitidae) species. **Jayshree Patel** (jayshree.patel@ufl.edu), Thomas Chouvenc and Nan-Yao Su, Univ. of Florida, Davie, FL

D3007 Effective of freezing treatment for managing Indian meal moth (*Plodia interpunctella*) infestations in coffee bean warehouses. **Xiaodan Pan** (xiaodan.pan@rutgers.edu) and Changlu Wang, Rutgers, The State Univ. of New Jersey, New Brunswick, NJ

D3008 Improving RNA interference efficiency in lepidopteran insect, *Spodoptera frugiperda*. **Jinmo Koo** (jko256@uky.edu), Xien Chen, Guan-Heng Zhu and Subba Reddy Palli, Univ. of Kentucky, Lexington, KY

D3009 The smell of death: A quantitative review. **Jizhe Shi** (jizhe.shi@uky.edu)¹, Qian "Karen" Sun², Austin Merchant¹ and Xuguo Zhou¹, ¹Univ. of Kentucky, Lexington, KY, ²Louisiana State Univ., Baton Rouge, LA

Presentations: Poster/Infographic Displays

D3010 Could DNA in mosquito saliva assist in surveillance?
Nicholas First (njf84@msstate.edu)¹, Aline Badial² and Jonas G. King², ¹Mississippi State Univ., Starkville, MS, ²Mississippi State Univ., Mississippi State, MS

Grad Infographic: P-IE 1

Exhibit Hall 1 & 2 (America's Center)

D3011 Using gall-forming insects as biological control agents.
Theresa Barosh (theresa.barosh@colostate.edu) and Paul Ode, Colorado State Univ., Fort Collins, CO

D3012 Presentation withdrawn

D3013 A new tool in the toolbox? Using gut molecular content to monitor spotted-wing drosophila movement. **Laura Kraft** (ljkraft@ncsu.edu)¹, Lauren Diepenbrock², Tim Sit¹ and Hannah Burrack¹, ¹North Carolina State Univ., Raleigh, NC, ²Univ. of Florida, Lake Alfred, FL

D3014 Endophytic fungi and integrated pest management.
Janaina Camara Siqueira da Cunha (janaina.cunha@tamu.edu) and Gregory Sword, Texas A&M Univ., College Station, TX

D3015 Presentation withdrawn

D3016 Mushroom pest control at a glance. **Grace Sward** (sward.6@buckeyemail.osu.edu) and Luis Canas, The Ohio State Univ., Wooster, OH

D3017 We are parasitoids. **Blessing Ademokoya** (bademokoya@huskers.unl.edu)¹, Thomas Hunt² and Robert Wright¹, ¹Univ. of Nebraska, Lincoln, NE, ²Univ. of Nebraska, Concord, NE

D3018 Agronomic and pest control benefits of a dry edible bean-winter wheat relay cropping system. **Jeffrey Cluever** (cluever.jeffrey@huskers.unl.edu)¹, Robert Wright², Nevin Lawrence¹ and Jeffrey Bradshaw¹, ¹Univ. of Nebraska, Scottsbluff, NE, ²Univ. of Nebraska, Lincoln, NE

D3019 Considering failure: Two years of research on *Paralobesia viteana*, the American grape berry moth. **Pragya Chalise** (pragyac9@vt.edu) and Douglas G. Pfeiffer, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

D3020 What are invasive insect mutualisms? **Jocelyn R. Holt** (holtjocelyn@tamu.edu) and Raul F. Medina, Texas A&M Univ., College Station, TX

Grad Infographic: P-IE 2

Exhibit Hall 1 & 2 (America's Center)

D3021 The most destructive corn pest you have never heard of.
Michelle Gregory (michelle.gregory@ars.usda.gov), USDA - ARS, Columbia, MO

D3022 Role of fall armyworm secretions in modulating sorghum defenses. **Sajjan Grover** (sajan.grover@huskers.unl.edu)¹, Earl Agpawa¹, Scott E. Sattler² and Joe Louis¹, ¹Univ. of Nebraska, Lincoln, NE, ²USDA - ARS, Lincoln, NE

D3023 Mycorrhizae toggle rice defense genes in response to herbivore feeding. **Lina Bernaola** (lbernaola@agcenter.lsu.edu) and Mike Stout, Louisiana State Univ., Baton Rouge, LA

D3024 Impact of insecticides in a cover crop to corn systems.
Gabriela Inveninato Carmona (gabiinveninato@gmail.com) and Anthony McMechan, Univ. of Nebraska, Lincoln, NE

D3025 What cover crop should you choose? **Alex Michels** (alex.michels@ecdysis.bio), South Dakota State Univ., Brookings, SD; Ecdysis Foundation, Estelline, SD

D3026 Methods for managing Varroa mites. **Morgan Roth** (mroth11@vt.edu), James M. Wilson and Aaron Gross, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

D3027 Changes in the phenology of the southeastern blueberry bee (*Habropoda laboriosa*) based on historic collections data. **Sarah Anderson** (andersonsarah@ufl.edu) and Rachel Mallinger, Univ. of Florida, Gainesville, FL

D3028 The buzz about native pollinators: Not just bees! **Katlyn Catron** (kcatron@vt.edu), Virginia Polytechnic Institute and State Univ., Blacksburg, VA

D3029 IPM4Bees: Midwest working group's Varroa mite management practices. **Ashley St. Clair** (astclair@iastate.edu)¹, Randall Cass², Matthew O'Neal¹ and Judy Wu-Smart³, ¹Iowa State Univ., Ames, IA, ²Iowa State Univ. Extension and Outreach, Ames, IA, ³Univ. of Nebraska, Lincoln, NE

D3030 "Ecoregion gardens:" A holistic approach to promoting native bee diversity (Hymenoptera: Anthophila) via fine-scale habitat simulation. **Jenna Crowder** (jlcrowd@g.clemson.edu), Clemson Univ., Clemson, SC

Grad Infographic: SysEB

Exhibit Hall 1 & 2 (America's Center)

D3031 Co-phylogenetic patterns of fungus-growing ants and their fungal cultivars: Evidence for cryptic speciation? **Katherine Beigel** (katherinebeigel@gmail.com), Univ. of Texas, Tyler, TX

D3032 The importance of systematic entomology in today's world. **Jill Oberski** (jtoberski@ucdavis.edu), Univ. of California, Davis, CA

D3033 What is an invasive species? **Tyler Hagerty** (hagertyt@udel.edu), Univ. of Delaware, Newark, DE

D3034 Meet the Auchenorrhyncha! **Rachel K. Skinner** (rskinn2@illinois.edu), Univ. of Illinois, Champaign, IL

D3035 FaceTime a FaceMite. **Orlando Combita Heredia** (combitaheredia.1@osu.edu) and Emily Sybolt, The Ohio State Univ., Columbus, OH

D3036 How much oxygen was there for giant dragonflies to breathe? **Sandra Schachat** (schachat@stanford.edu), Stanford Univ., Stanford, CA

D3037 Ask ancient carabids: Toward a time-calibrated phylogeny of Adephaga. **Olivia Boyd** (boydo@oregonstate.edu)¹ and Kipling Will², ¹Oregon State Univ., Corvallis, OR, ²Univ. of California, Berkeley, CA

D3038 Transgenerational RNAi knockdown of a heritable poxvirus demonstrates its mutualistic association with parasitoid wasps. **Kelsey Coffman** (kcoffman@uga.edu), Taylor Harrell and Gaelen Burke, Univ. of Georgia, Athens, GA

D3039 Bugs on bugs: The ectomicobiome of cicadas. **Catherine Dana** (cdana2@illinois.edu)^{1,2}, Bailey Clancy¹, Nenad Miljkovic², Donald Cropek³, Marianne Alleyne² and Mark Davis¹, ¹Illinois Natural History Survey, Champaign, IL, ²Univ. of Illinois, Champaign, IL, ³US Army Engineer Research and Development Center, Champaign, IL

Presentations: Poster/Infographic Displays

Grad Poster: MUVE 1

Exhibit Hall 1 & 2 (America's Center)

D3040 Culicoides diversity in the Southern California desert canyon. **Xinmi Zhang** (xzhan218@ucr.edu)¹, Alec Gerry¹ and Robert Phillips², ¹Univ. of California, Riverside, CA, ²Moab, UT

D3041 Seasonal monitoring of major arthropod vectors and vector-borne disease in Gyeongbuk Province, Republic of Korea, 2017–2018. **JaeSeok Lee** (hanhe9090@naver.com)¹, Wook-Gyo Lee² and Young Ho Kim¹, ¹Kyungpook National Univ., Sangju, South Korea, ²Korea Centers for Disease Control and Prevention, Cheongju, South Korea

D3042 Influence of aquatic habitat quality on seasonal diapause induction in the West Nile vector *Culex pipiens*. **Erica Hernandez** (ejean3036@gmail.com)^{1,2}, Andrew Mackay², Brian F. Allan¹ and Chris Stone², ¹Univ. of Illinois, Champaign, IL, ²Illinois Natural History Survey, Champaign, IL

D3043 Sugar feeding of *Aedes aegypti* and *Culex quinquefasciatus* mosquitoes in the Lower Rio Grande Valley of South Texas. **Mark Olson** (5senough@gmail.com)¹, Selene Luna-Garcia¹, Jose Juarez¹, Estelle Martin¹, Laura Harrington², Micky Eubanks¹, Ismael E. Badillo-Vargas¹ and Gabriel Hamer¹, ¹Texas A&M Univ., College Station, TX, ²Cornell Univ., Ithaca, NY

D3044 A comparison of *Dirofilaria immitis* infection rates in mosquito communities of urban and rural habitats in South Georgia and North Florida. **Christopher Slaton** (caslaton@valdosta.edu), Mark Blackmore, Eric Chambers and Jack Lockhart, Valdosta State Univ., Valdosta, GA

D3045 Evidence for family-level variation of phenotypic traits affecting vectorial capacity in response to temperature of Brazilian *Nyssorhynchus darlingi*. **Virginia Chu** (virgchu@gmail.com), Wadsworth Center, Slingerlands, NY

D3046 Studies of vector competence for Zika virus in *Aedes aegypti* populations from Florida. **Xiaodi Wang** (xiaodiwang@ufl.edu)¹, Seokyoung Kang², Jovana Bozic¹, Tanise Stenn¹, Rhoel Dinglasan² and Derrick Mathias¹, ¹Univ. of Florida, Vero Beach, FL, ²Univ. of Florida, Gainesville, FL

D3047 Presentation withdrawn

D3048 Differential insecticidal activity of *Chromobacterium* isolates against adult *Anopheles gambiae*. **Hannah MacLeod** (hmacleod@jhu.edu)¹, Raul Saraiwa¹, Eric Caragata¹, Sarah Short² and George Dimopoulos¹, ¹Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, ²The Ohio State Univ., Columbus, OH

D3049 Impacts on fitness and metabolism: Investigating the costs of insecticide resistance in invasive California *Aedes aegypti*. **Erin Kelly** (etaylorKelly2@gmail.com) and Geoffrey Attardo, Univ. of California, Davis, CA

Grad Poster: MUVE 2

Exhibit Hall 1 & 2 (America's Center)

D3050 Survey of ticks and tick-borne pathogens of feral swine. **Haylee Campbell** (hkc001@uark.edu), Allen Szalanski and Kelly Loftin, Univ. of Arkansas, Fayetteville, AR

D3051 Differential tick burdens on small mammal host species in central Pennsylvania. **Jessica Brown** (jebrown1519@gmail.com), Pennsylvania State Univ., University Park, PA

D3052 Vector-host incidence comparison between ITS1-ITS2 genotypes of *Cytauxzoon felis* in South Georgia. **Dariana Rodriguez** (dhrodriguezkesle@valdosta.edu), Eric Chambers, Mark Blackmore and Jack Lockhart, Valdosta State Univ., Valdosta, GA

D3053 Detection and tissue tropism of the rickettsial endosymbiont, *Rickettsia buchneri*, in field-collected Minnesota *Ixodes scapularis* ticks. **Cody Thorpe** (thorp113@umn.edu), Univ. of Minnesota, St. Paul, MN

D3054 Detection and discrimination of three *Anaplasma* species infecting livestock using recombinase polymerase amplification (RPA). **Andrea Salazar** (andrsa@okstate.edu), Francisco Ochoa-Corona, Justin Talley and Bruce Noden, Oklahoma State Univ., Stillwater, OK

D3055 The impact of tick-borne pathogens infection on the microbiome composition of the tick vector. **Abdulsalam Adegoke** (abdulsalam.adegoke@usm.edu) and Shahid Karim, The Univ. of Southern Mississippi, Hattiesburg, MS

D3056 Baculovirus surface display of porcine epidemic diarrhea virus spike protein to improve immunogenicity and protective efficacy. **Wei-Ting Hsu** (waitinglovekeroro@gmail.com) and Yu-Chan Chao, Academia Sinica, Taipei, Taiwan

D3057 Development of effective attractants and repellents to reduce stable flies (*Stomoxys calcitrans*) on pastured cattle via a push-pull strategy. **Alexander Lehmann** (alehmann_1@yahoo.com)¹, Gwang hyun Roh², Jerry Zhu³, David Taylor³, Gary Brewer¹ and David Boxler⁴, ¹Univ. of Nebraska, Lincoln, NE, ²USDA - ARS, Hilo, HI, ³USDA - ARS, Lincoln, NE, ⁴Univ. of Nebraska, North Platte, NE

D3058 Aerating black soldier fly larvae for cooling. **Olga Shishkov** (olga.shishkov@gatech.edu) and David Hu, Georgia Institute of Technology, Atlanta, GA

Grad Poster: MUVE 3

Exhibit Hall 1 & 2 (America's Center)

D3059 Histamine's contribution to bed bug aggregation behavior. **Paul Baker** (paul.baker1@uky.edu) and Kenneth Haynes, Univ. of Kentucky, Lexington, KY

D3060 Discontinuous gas exchange in invasive and native pest fire ants, *Solenopsis* spp., in the southeastern United States: Effects of differences in species, caste, size and temperature. **Olufemi Ajayi** (osa0001@auburn.edu), Arthur G. Appel and Henry Fadamiro, Auburn Univ., Auburn, AL

D3061 Analysis of Bryan/College Station, Texas *Solenopsis invicta* Buren (Hymenoptera: Formicidae) colonies to evaluate presence of the viral pathogen *Solenopsis invicta* Virus-3. **Valerie Holmes** (vrh0933406@tamu.edu) and J. Spencer Johnston, Texas A&M Univ., College Station, TX

D3062 Associative learning of food odors by *Polistes dominula* (Christ), *P. exclamans* Viereck, and *P. metricus* Say (Hymenoptera: Vespidae). **Megan Asche** (megan.asche@wsu.edu)¹ and Peter Landolt², ¹Washington State Univ., Pullman, WA, ²USDA - ARS, Wapato, WA

D3063 Morphometric analysis of the antennae and caste-specific characterization of antennal sensilla in the Formosan subterranean termite, *Coptotermes formosanus*. **Paula Castillo** (pcasti7@lsu.edu), Nathan Le and Qian "Karen" Sun, Louisiana State Univ., Baton Rouge, LA

Presentations: Poster/Infographic Displays

D3064 Temperature preference of two invasive subterranean termite species and their hybrids (Blattodea: Rhinotermitidae: *Coptotermes*). **Jayshree Patel** (jayshree.patel@ufl.edu), Thomas Chouenc and Nan-Yao Su, Univ. of Florida, Davie, FL

D3065 Characterization of the microbial communities from the alimentary canal of *Typhaea stercorea* (L.) (Coleoptera: Mycetophagidae). **Julius Eason** (eason2@purdue.edu), Laramy Enders, Michael Scharf and Linda Mason, Purdue Univ., West Lafayette, IN

D3066 Potential for an alarm pheromone as a repellent to protect dry-cured hams from the mold mite, *Tyrophagus putrescentiae* (Schrank) (Acar: Acaridae). **Naomi Manu** (nmanu30@ksu.edu)¹, Jacqueline Maille¹, M. Wes Schilling² and Thomas Phillips¹, ¹Kansas State Univ., Manhattan, KS, ²Mississippi State Univ., Mississippi State, MS

Grad Poster: PBT 1

Exhibit Hall 1 & 2 (America's Center)

D3067 Transcriptional changes of *Drosophila melanogaster* in the physiological responses to chemical exposure. **KyungHwan Moon** (mkh630@naver.com), YeongHo Kim and Young Ho Kim, Kyungpook National Univ., Sangju, South Korea

D3068 Investigating the effect of monoterpenes and monoterpenoids on the *Dermacentor variabilis* acetylcholinesterase. **Courtney Huerter** (chuertcr@iastate.edu) and Joel R. Coats, Iowa State Univ., Ames, IA

D3069 Insights into the repellency effect of DEET in the American dog tick (*Dermacentor variabilis*). **Cody Koloski** (cody0071@hotmail.com), Carlyn Duncan, Patrick Gohl and Bryan Cassone, Brandon Univ., Brandon, MB, Canada

D3070 Ionotropic receptor function in *Anopheles gambiae*. **Chloe Greppi** (cgreppi@brandeis.edu)¹, Willem Laursen¹, Gonzalo Budelli¹, Elaine Chang¹, Abigail Daniels¹, Lena van Giesen¹, Andrea Smidler², Flaminia Catteruccia² and Paul Garrity¹, ¹Brandeis Univ., Waltham, MA, ²Harvard School of Public Health, Boston, MA

D3071 Neurogenomic analyses of honey bee aggression at the single-cell level. **Ian Traniello** (traniel2@illinois.edu), Amy Cash-Ahmed, Sihai Dave Zhao, Alison Sankey and Gene E. Robinson, Univ. of Illinois, Champaign, IL

D3072 New techniques for answering old questions: Measuring gene expression in diapausing *Megachile rotundata*. **Lizzette Cambron** (liz.cambron@ndsu.edu)¹, George Yocum² and Kendra Greenlee¹, ¹North Dakota State Univ., Fargo, ND, ²USDA - ARS, Fargo, ND

D3073 MicroRNA regulation of worker behavioral maturation in the western honey bee, *Apis mellifera*. **Sarai H. Stuart** (saraihs2@illinois.edu) and Gene E. Robinson, Univ. of Illinois, Champaign, IL

D3074 Combined transcriptomic and proteomic analyses of venom proteins from the ectoparasitoid *Habrobracon hebetor* (Hymenoptera: Braconidae). **Kaili Yu** (11716076@zju.edu.cn), Shijiao Xiong, Qi Fang and Gongjin Ye, Zhejiang Univ., Hangzhou, China

D3075 Building a better beetle: Improving CRISPR/Cas9 tools in coleopteran model *Tribolium castaneum*. **Nicole Gutzmann** (negutzma@ncsu.edu) and Marcé Lorenzen, North Carolina State Univ., Raleigh, NC

D3076 Ecdysone and insulin signaling pathways mediate exaggerated trait growth in the Japanese rhinoceros beetle, *Trypoxylus dichotomus*. **Abigail Hayes** (abigail.hayes@wsu.edu)¹, Mark Lavine¹, Hiroki Gotoh² and Laura Lavine¹, ¹Washington State Univ., Pullman, WA, ²National Institute of Genetics, Shizuoka, Japan

D3077 LRPPRC is required for wing development in red flour beetle, *Tribolium castaneum*. **Yaoyu Jiao** (y.jiao@uky.edu) and Subba Reddy Palli, Univ. of Kentucky, Lexington, KY

D3078 Suppression of cytoplasmic incompatibility. **Gagan Deep Sharma** (gzs0034@tigermail.auburn.edu), Auburn Univ., Auburn, AL

Grad Poster: PBT 2

Exhibit Hall 1 & 2 (America's Center)

D3079 Investigating symbiont-mediated neonicotinoid detoxification in the eastern subterranean termite, *Reticulitermes flavipes*. **Alison Blanton** (ablanto@siue.edu) and Brittany Peterson, Southern Illinois Univ., Edwardsville, IL

D3080 Nicotine metabolism in *Trichoplusia ni*: A toxicogenomic approach. **Nazli Hassanpour Farshour** (nazhassanpour@gmail.com), Brett Saremba and Mark Rheault, The Univ. of British Columbia, Kelowna, BC, Canada

D3081 Evaluating cross-tolerance to stress in Colorado potato beetle, *Leptinotarsa decemlineata*. **Erika Bueno** (embueno@uvm.edu), Kaitlyn Maines, Sophie Heny and Yolanda Chen, Univ. of Vermont, Burlington, VT

D3082 Evaluating resistance to Cry34/35Ab1 by western corn rootworm. **Elliott Smith** (esmith5@iastate.edu)¹, Brad Coates² and Aaron J. Gassmann¹, ¹Iowa State Univ., Ames, IA, ²USDA - ARS, Ames, IA

D3083 Transcriptional plasticity of a generalist herbivore in adaptation to mite growth inhibitors. **Adekunle Adesanya** (adekunle.adesanya@wsu.edu)¹, Laura Lavine¹, Fang Zhu² and Doug Walsh³, ¹Washington State Univ., Pullman, WA, ²Pennsylvania State Univ., University Park, PA, ³Washington State Univ., Prosser, WA

D3084 Susceptibility of *Aphis gossypii* to imidacloprid in Alabama. **John Mahas** (jwm0055@auburn.edu) and Alana Jacobson, Auburn Univ., Auburn, AL

D3085 *Aedes* mosquitoes in Alabama: Population dynamics and sensitivity to insecticides. **Yifan Wang** (yzw0093@auburn.edu) and Nannan Liu, Auburn Univ., Auburn, AL

D3086 Assessing insecticide resistance in two South Georgia vector mosquito species. **Emily Evans** (eeevans@valdosta.edu), Mark Blackmore, Eric Chambers and Jack Lockhart, Valdosta State Univ., Valdosta, GA

D3087 Insecticide resistance and male reproductive fitness in the mosquito, *Aedes aegypti*. **Lindsey Mack** (llmack@ucdavis.edu) and Geoffrey Attardo, Univ. of California, Davis, CA

D3088 Exploring acetylcholinesterase inhibition using terpenoids and a new class of natural insecticides on the yellow fever mosquito, *Aedes aegypti*. **Jacob Johnson** (jacob14@iastate.edu), Courtney Huerter and Joel Coats, Iowa State Univ., Ames, IA

Presentations: Poster/Infographic Displays

Grad Poster: PBT 3

Exhibit Hall 1 & 2 (America's Center)

D3089 Effects of pymetrozine on reproductive behavior of brown planthopper *Nilaparvata lugens* and fruit fly *Drosophila melanogaster*. **Lixiang Wang** (wanglixiang520nj@126.com), Nanjing Agricultural Univ., Nanjing, China

D3090 Chemical composition, insecticidal and repellent activity of essential oils against the maize weevil, *Sitophilus zeamais* Motschulsky. **Yunho Yang** (uknownsheep@snu.ac.kr) and Jun-Hyung Tak, Seoul National Univ., Seoul, South Korea

D3091 Investigation of leaf decomposition following use of trunk injected insecticides to control emerald ash borer. **Rasha Alakeel** (rasha4master@hotmail.com) and Whitney Cranshaw, Colorado State Univ., Fort Collins, CO

D3092 Assessing the effects of common garden pesticides on alfalfa leafcutting bees (*Megachile rotundata*). **Olivia Kline** (okline@email.uark.edu) and Neelendra Joshi, Univ. of Arkansas, Fayetteville, AR

D3093 Direct exposure toxicity of formulated insecticide mixtures to blue orchard bees. **Joseph Belsky** (jebelsky@email.uark.edu) and Neelendra Joshi, Univ. of Arkansas, Fayetteville, AR

D3094 Chronic high dose thiamethoxam exposure decreases overwinter survival of *Apis mellifera* L. **Sarah Wood** (sarah.wood@usask.ca), Ivanna Kozii, Igor Medici de Mattos, Colby Klein, Roney de Carvalho Macedo Silva, Ihor Dvilyuk, Igor Moshynskyy, Tasha Epp and Elemir Simko, Univ. of Saskatchewan, Saskatoon, SK, Canada

D3095 Presentation withdrawn

D3096 Indirect effects of neonicotinoid exposure on lepidopteran pollinators. **Staci Cibotti** (snc157@psu.edu), Ruud Schilder and Jared Ali, Pennsylvania State Univ., University Park, PA

D3097 Monarch butterfly oviposition response to milkweed treated with a systemic neonicotinoid insecticide. **Alex Mullins** (mullinsa@iastate.edu), Iowa State Univ., Ames, IA

D3098 Toxicology of a pyrethroid insecticide in the monarch butterfly (*Danaus plexippus*) and interactions with host plant defense chemicals and chemical fertilizers. **Annie Krueger** (annie.krueger@huskers.unl.edu), Haley Moyer, Terence Spencer, Tom Weissling, Ana Vélez and Troy Anderson, Univ. of Nebraska, Lincoln, NE

D3099 Evaluation of artificial diet on monarchs (*Danaus plexippus* L.) population growth parameters for pesticide bioassays. **Matthew Greiner** (matthew.a.m.greiner@gmail.com), Annie Krueger, Terrence A. Spencer, Troy Anderson, Thomas Weissling and Ana Vélez, Univ. of Nebraska, Lincoln, NE

Grad Poster: PBT 4

Exhibit Hall 1 & 2 (America's Center)

D3100 Mannitol ingestion causes concentration-dependent, sex-biased mortality in adults of the fruit fly (*Drosophila melanogaster*). **Katherine Fiocca** (kaf363@drexel.edu), Meghan Barrett, Edward Waddell, Jennifer Viveiros, Cheyenne McNair, Sean O'Donnell and Daniel Marenda, Drexel Univ., Philadelphia, PA

D3101 The impacts of aggregations on energy use in a diapausing beetle (*Hippodamia convergens*). **Andre Szejner-Sigal** (aszejner@berkleey.edu) and Caroline M. Williams, Univ. of California, Berkeley, CA

D3102 Effects of caste on critical PO₂ and flight metabolic rate in the bumble bee, *Bombus impatiens*. **Rikki Walter** (riikki.walter@ndsu.edu)¹, Georgia Starr Davis¹, Joseph P. Rinehart², George Yocum² and Kendra Greenlee¹, ¹North Dakota State Univ., Fargo, ND, ²USDA - ARS, Fargo, ND

D3103 Mite-infested pupae as stimuli for Varroa-sensitive hygiene. **Angus Catchot III** (alc607@msstate.edu), Mississippi State Univ., Starkville, MS

D3104 Honey bee (*Apis mellifera*) macronutrient regulation: Nurse bee nutritional preferences for proteins and lipids. **Pierre Lau** (plau0168@tamu.edu), Alexandria Payne, Jordan Gomez, Cora Garcia, Pierre Lesne, Spence Behmer and Juliana Rangel, Texas A&M Univ., College Station, TX

D3105 Interspecies virus transmission between ants and honey bees (*Apis mellifera*). **Alexandria Payne** (alexnpayne@gmail.com) and Juliana Rangel, Texas A&M Univ., College Station, TX

D3106 What to eat when you live in manure. **Elizabeth Taylor** (ehart3@niu.edu) and Bethia H. King, Northern Illinois Univ., DeKalb, IL

D3107 Identification and functional analysis of the (+) ssRNA virus in *Pachycrepoideus vindemmiae*. **Jiao Zhang** (zhangjiao@zju.edu.cn), Fei Wang, Qi Fang and Gongyin Ye, Zhejiang Univ., Hangzhou, China

Grad Poster: P-IE, Biological Control

Exhibit Hall 1 & 2 (America's Center)

D3108 Effect of simulated herbivory on Chinese tallow: Prospects for biological control in Louisiana. **Omosola Omoeyele** (savvy715@yahoo.com)¹, Dora Sevor², Shironne Marshall², Veronica Manrique² and Rodrigo Diaz³, ¹Southern Univ. AG Center, Baton Rouge, LA, ²Southern Univ. and A&M College, Baton Rouge, LA, ³Louisiana State Univ., Baton Rouge, LA

D3109 Effect of repeated exposure of *Calophya lutea* (Hemiptera: Calophyidae) on Brazilian peppertree, *Schinus terebinthifolia*. **Kelly Carruthers** (kelly.carruthers@ufl.edu)¹, Larissa Bini², Eutychus M. Kariuki¹ and Carey Minteer¹, ¹Univ. of Florida, Fort Pierce, FL, ²Univ. Regional de Blumenau, Blumenau, Brazil

D3110 Examining pre-alightment host-selection of a biological control candidate *Ceutorhynchus rusticus* for *Isatis tinctoria* in response to olfactory and visual cues of nontarget confamilial plants. **Bijay Subedi** (bsubedi@uidaho.edu)¹, Mark Schwarzländer¹, Sanford Eigenbrode¹, Bradley L. Harmon¹ and Philip Weyl², ¹Univ. of Idaho, Moscow, ID, ²CABI, Delémont, Switzerland

D3111 A novel approach to weed biological control host range testing for non-target plant species restricted to highly specialized soils. **Sujan Panta** (sujanp@uidaho.edu)¹, Mark Schwarzländer¹, Philip Weyl², Sanford Eigenbrode¹, Bradley L. Harmon¹ and Harriet Hinz², ¹Univ. of Idaho, Moscow, ID, ²CABI, Delémont, Switzerland

D3112 Attraction rates of different wavelengths of LED to *Bemisia tabaci* (Hemiptera: Aleyrodidae) and *Nesidiocoris tenuis* (Hemiptera: Miridae). **Young-gyun Park** (insect1141@snu.ac.kr) and Joon-Ho Lee, Seoul National Univ., Seoul, South Korea

D3113 Trait mediated indirect interactions in aphids: *Myzus persicae* alter dispersal and feeding behaviors in response to predation risk. **Rachel Norris** (rnorr001@ucr.edu), Kerry Mauck and Erin Wilson Rankin, Univ. of California, Riverside, CA

D3114 Strange oviposition behavior in *Dionus pumilio* and *Rhyzobius lophanthae* (Coleoptera: Coccinellidae). **Iris Chien** (itai001@ucr.edu) and Richard Stouthamer, Univ. of California, Riverside, CA

Presentations: Poster/Infographic Displays

D3115 Impact of natural enemies on populations of *Diaphorina citri* under various orchard management practices in Florida citrus.
Binita Shrestha (b.shrestha@ufl.edu) and Lukasz Stelinski, Univ. of Florida, Lake Alfred, FL

D3116 Assessing hymenopteran parasitoids for the integrated control of economically important cutworms (Lepidoptera: Noctuidae) in the Canadian Prairies. **R. W. M. Udari Wanigasekara** (udari_madu@yahoo.com)¹ and Barbara Sharanski², ¹Univ. of Manitoba, Winnipeg, MB, Canada, ²Univ. of Central Florida, Orlando, FL

D3117 The effects of belowground chemical cues from entomopathogenic nematodes and conspecific herbivory on host selection of diabroticite beetle larvae and their natural enemies.

John Grunseich (johngrunseich@tamu.edu) and Anjel Helms, Texas A&M Univ., College Station, TX

D3118 Presentation withdrawn

Grad Poster: P-IE, Ecology 1

Exhibit Hall 1 & 2 (America's Center)

D3119 Are natural enemies related to plant diversity in agricultural drainage ditches? **Darsy Smith** (dsmith28@umd.edu), Alina Avanesyan and William Lamp, Univ. of Maryland, College Park, MD

D3120 Capacity of beneficial arthropod communities to overwinter within CRP pollinator habitat. **C. Scott Clem** (carlc2@illinois.edu) and Alexandra Harmon-Threatt, Univ. of Illinois, Champaign, IL

D3121 Influence of cover crops on arthropod diversity in woody ornamental production systems. **Axel Murillo** (adgonzal24@gmail.com), Jason Oliver, Paul O'Neal and Karla Addesso, Tennessee State Univ., McMinnville, TN

D3122 Living on the edge: Determining the potential of multipurpose perennial crops as habitat for native pollinators and natural enemies. **Jessica Butters** (buttersj1@central.edu)¹, Brian Spiesman¹, Ebony Murrell² and Tania N. Kim¹, ¹Kansas State Univ., Manhattan, KS, ²The Land Institute, Salina, KS

D3123 Arthropod community composition and potential drivers in current and projected agricultural systems in the Inland Pacific Northwest. **Jessica Kalin** (kali0912@vandals.uidaho.edu) and Sanford Eigenbrode, Univ. of Idaho, Moscow, ID

D3124 Increasing lawn diversity to promote biodiversity and reduce management inputs in urban landscapes. **Balwinder Kaur** (bkaur@ufl.edu), Brianna Whitman, Basil Iannone and Adam Dale, Univ. of Florida, Gainesville, FL

D3125 Canopy arthropod population response to experimental canopy opening. **Manoj Pandey** (pandeymanoz@gmail.com) and Tim Schowalter, Louisiana State Univ., Baton Rouge, LA

D3126 Effects of grassland restoration on beetles in Alabama's Black Belt Prairie. **Thomas Franzem** (tfraenzem@crimson.ua.edu), Univ. of Alabama, Tuscaloosa, AL

D3127 Estimates of butterfly density in mixed-grass prairie with restored disturbance regimes. **Brooke Karasch** (brooke.karasch@ndsu.edu), Torre Hovick, Ryan Limb, Jason Harmon and Kevin Sedivec, North Dakota State Univ., Fargo, ND

D3128 How plant and insect communities influence the oviposition behavior of the monarch butterfly, *Danaus plexippus*.
Chih-Chung Lee (cclee@huskers.unl.edu) and Brigitte Tenhumberg, Univ. of Nebraska, Lincoln, NE

D3129 Development of species distribution models for the migratory moths under climate change in South Korea with non-meteorological land-use data. **Hyo Jin Jeong** (hyojh9902@gmail.com), Ho Jung Jang and Jung-Joon Park, Gyeongsang National Univ., Jinju, South Korea

Grad Poster: P-IE, Ecology 2

Exhibit Hall 1 & 2 (America's Center)

D3130 Development of species distribution models for the migratory planthoppers under climate change in South Korea with non-meteorological land-use data. **Ho Jung Jang** (ghwn975@naver.com), Hyo Jin Jeong and Jung-Joon Park, Gyeongsang National Univ., Jinju, South Korea

D3131 Emergent methods for estimating invertebrate biodiversity in dead wood. **Kristy McAndrew** (kmcandrew@entomology.missouri.edu)¹, Natalie Clay², Courtney Siegert³, Juliet Tang⁴ and John Riggins⁵, ¹Mississippi State Univ., Starkville, MS, ²Louisiana Tech Univ., Ruston, LA, ³USDA - ARS, Stoneville, MS, ⁴USDA - Forest Service, Starkville, MS, ⁵Mississippi State Univ., Mississippi State, MS

D3132 Saproxyllic insect diversity along decomposition of *Quercus* dead wood. **JiWon Kang** (euplectitae@naver.com)¹, Jong-Seok Park¹ and Seung-II Lee², ¹Chungbuk National Univ., Cheongju, South Korea, ²Natural Resources Canada, Edmonton, AB, Canada

D3133 Plant-mediated long-range host discrimination in a solitary parasitoid species. **Basu Kafle** (bzk0055@auburn.edu), Tolulope Morawo and Henry Fadamiro, Auburn Univ., Auburn, AL

D3134 Active chemical compound/group of compounds for plant defense priming. **Bipana Paudel Timilsena** (bipspau@gmail.com)¹, Irmgard Seidl-Adams¹, Serah Hind² and James Tumlinson¹, ¹Pennsylvania State Univ., University Park, PA, ²Univ. of Illinois, Champaign, IL

D3135 Cannibalism in *Spodoptera frugiperda* caterpillars in relation to plant defenses. **Rajeev Roy** (r-roy@wiu.edu) and Richard Musser, Western Illinois Univ., Macomb, IL

D3136 Garden bacteria of fungus-farming ants can metabolize plant secondary compounds. **Charlotte Francoeur** (francoeur@wisc.edu), Lily Khadempour, Ken Keefover-Ring and Cameron Currie, Univ. of Wisconsin, Madison, WI

D3137 Identification and characterization of soybean aphid amino acid transporters at aphid-*Bunchera* interface. **Shailesh Raj Acharya** (shailesh@colostate.edu) and Vamsi Nalam, Colorado State Univ., Fort Collins, CO

D3138 Post emergence reproductive phenology and partial life table analysis of the brown marmorated stink bug (*Halyomorpha halys*). **Thomas Ohmen** (tmohmen@ncsu.edu)¹, George Kennedy¹ and Jim Walgenbach², ¹North Carolina State Univ., Raleigh, NC, ²North Carolina State Univ., Mills River, NC

D3139 Presentation withdrawn

D3140 Impervious surface enhance the chances of overwintering survival of evergreen bagworm. **Sujan Dawadi** (sdawadi@purdue.edu) and Clifford Sadof, Purdue Univ., West Lafayette, IN

Presentations: Poster/Infographic Displays

Grad Poster: P-IE, IPM 1

Exhibit Hall 1 & 2 (America's Center)

D3141 Efficacy of aerial insecticide applications targeting adult western corn rootworms in Nebraska. **Timothy B. Dang** (tdang@huskers.unl.edu)¹, Clint Pilcher², Matthew W Carroll³, Jeffrey T. Krumm⁴, John Fietsam³, Graham P. Head⁵ and Lance J. Meinke¹, ¹Univ. of Nebraska, Lincoln, NE, ²Corteva Agriscience, Johnston, IA, ³Bayer Crop Science, St. Louis, MO, ⁴Corteva Agriscience, Hastings, NE, ⁵Bayer Crop Science, Chesterfield, MO

D3142 Adult and larval western corn rootworm (*Diabrotica virgifera virgifera*) baseline susceptibility to *DvSnf7* dsRNA. **Matthew Welter** (mjwelter@huskers.unl.edu)¹, William Moar², Chitvan Khajuria³, Lance J. Meinke¹ and Ana Vélez¹, ¹Univ. of Nebraska, Lincoln, NE, ²Bayer Crop Science, Chesterfield, MO, ³Bayer Crop Science, St. Louis, MO

D3143 Susceptibility to Bt maize and the influence thereof on life-history parameters of *Spodoptera frugiperda* (Lepidoptera: Noctuidae) in South Africa. **Andries Botha** (hwuluan@gmail.com)¹, Annemie Erasmus², Hannalene Du Plessis¹ and Johnnie Van den Berg¹, ¹North-West Univ., Potchefstroom, South Africa, ²Agricultural Research Council, Potchefstroom, South Africa

D3144 Refining pest management thresholds for water-deficit cotton production. **Allison Randell** (akr09312@uga.edu)¹, Michael Toews¹, Katie Lewis², Suhas Vyavhare², Abdul Hakeem², Donna McCallister² and Megha N. Parajulee², ¹Univ. of Georgia, Tifton, GA, ²Texas A&M AgriLife Research and Extension Center, Lubbock, TX

D3145 Risk assessment of wireworm to crop production. **Ivan Drahun** (ivandrahun7@gmail.com)¹, Kiana Wiebe¹, Bryan Cassone¹ and Wim van Herk², ¹Brandon Univ., Brandon, MB, Canada, ²Agriculture and Agri-Food Canada, Agassiz, BC, Canada

D3146 Antixenosis of soybean genotypes to *Anticarsia gemmatalis* (Lepidoptera: Erebidae). **Sabrina Ongarotto** (sabrina.ongarotto@hotmail.com), Jéssica Emiliane Rodrigues Gorri, Maria Clézia Santos, Carolina Moraes Silveira, Isabella Rubio Cabral, Gabriela Pereira Schulz, Maria Márcia Pereira Sartori and Edson Luiz Lopes Baldin, Univ. Estadual Paulista, Botucatu, Brazil

D3147 Feeding preference affects fitness of soybean aphids on host plants. **William Pitt** (wjpit@rams.colostate.edu)¹, Callie Slaughter¹, Shailesh Acharya¹, Jinlong Han², Punya Nachappa¹ and Vamsi Nalam¹, ¹Colorado State Univ., Fort Collins, CO, ²North Carolina State Univ., Raleigh, NC

D3148 Insecticide efficacy evaluation for soybean gall midge. **Mitchell Helton** (mhelton@iastate.edu)¹, Greg VanNostrand¹, Justin McMechan² and Erin Hodgson¹, ¹Iowa State Univ., Ames, IA, ²Univ. of Nebraska, Lincoln, NE

D3149 Effect of *Dectes texanus* in the physiological yield of soybeans in Kentucky. **Izabela Gomes** (izabela.gomes@uky.edu)¹ and Raul T. Villanueva², ¹Univ. of Kentucky, Lexington, KY, ²Univ. of Kentucky, Princeton, KY

D3150 Comparing sustainable and prophylactic management tactics to control stink bugs in soybeans. **Yaziri Gonzalez** (yazgonzalez17@uky.edu) and Raul T. Villanueva, Univ. of Kentucky, Princeton, KY

Grad Poster: P-IE, IPM 2

Exhibit Hall 1 & 2 (America's Center)

D3151 Non-target effects of herbicides on aquatic invertebrates. **Alyssa Lucas** (alyssa.l.lucas@gmail.com) and Kevin Rice, Univ. of Missouri, Columbia, MO

D3152 Evaluating the correlation between sucrose content and sorghum resistance to sugarcane aphid, *Melanaphis sacchari*.

Ethan Triplett (ethan.l.triplett@gmail.com) and Bonnie Pendleton, West Texas A&M Univ., Canyon, TX

D3153 Effects of fertilizer on pest population growth in quinoa.

Elisabeth Oeller (elisabeth.oeller@wsu.edu) and David Crowder, Washington State Univ., Pullman, WA

D3154 Relative impact of different companion plantings on population dynamics of wheat aphid, *Sitobion avenae*, under field condition. **Muhammad Seyab** (seyabkhan93@gmail.com) and Tariq Mustafa, Univ. of Agriculture, Faisalabad, Pakistan

D3155 Utilizing plant tolerance as an alternative management tactic against insect pests of rice (*Oryza sativa* L.). **James Michael Villegas** (jamesvillegas12@gmail.com), Blake Wilson and Mike Stout, Louisiana State Univ., Baton Rouge, LA

D3156 Seasonal population distribution and monitoring trap optimization of brown marmorated stink bug, *Halymomorpha halys* (Stål) (Hemiptera: Pentatomidae) in Georgia. **Dilani Patel** (dilani.patel@uga.edu)¹, Brett Blaauw¹, Michael Toews², Glynn Tillman³ and Ashfaq Sial¹, ¹Univ. of Georgia, Athens, GA, ²Univ. of Georgia, Tifton, GA, ³USDA - ARS, Tifton, GA

D3157 Impact of brown marmorated stink bug feeding on tart cherry quality and yield in Utah. **Zachary Schumm** (zach.schumm@aggiemail.usu.edu), Diane G. Alston and Lori Spears, Utah State Univ., Logan, UT

D3158 Lethal and sublethal effects of an insect growth regulator, pyriproxyfen, on *Drosophila suzukii* (Diptera: Drosophilidae). **Bariscan Tunckol** (it85156@uga.edu), Univ. of Georgia, Athens, GA

D3159 Incomplete shade net enclosures induce behavioral avoidance in codling moth. **Adrian Marshall** (atmarshall@wsu.edu) and Elizabeth Beers, Washington State Univ., Wenatchee, WA

D3160 Effects of gamma radiation on flight performance of navel orangeworm. **Joshua Reger** (jereger@mail.fresnostate.edu)¹, Jacob Wenger¹, Charles Burks² and Houston Wilson³, ¹California State Univ., Fresno, CA, ²USDA - ARS, Parlier, CA, ³Univ. of California, Parlier, CA

Grad Poster: P-IE, IPM 3

Exhibit Hall 1 & 2 (America's Center)

D3161 Effect of spray volume and application frequency on insecticide efficacy against western flower thrips (*Frankliniella occidentalis*) and citrus mealybug (*Planococcus citri*) under greenhouse conditions. **Devin Radosevich** (devinrados@earthlink.net) and Raymond Cloyd, Kansas State Univ., Manhattan, KS

D3162 Evaluation of systemic fungicides for control of nursery-attacking ambrosia beetles. **Vivek Ojha** (vivekojha360093@gmail.com), Jason Oliver, Karla Addesso, Fulya Baysal-Gurel, Nadeer Youssef and Terri Simmons, Tennessee State Univ., McMinnville, TN

D3163 Symbiotic bark beetle communities in lightning struck longleaf pine trees. **Benjamin Gochnour** (bmg1110@gmail.com), Univ. of Georgia, Athens, GA

D3164 Characterizing billbug (*Sphenophorus* spp.) seasonal biology across different regions using DNA barcodes and simple morphometric analysis. **Marian Rodriguez Soto** (rodri561@purdue.edu)¹, Laramy Enders¹, Linda Mason¹, Ricardo Ramirez², Xi Xiong³ and Douglas Richmond¹, ¹Purdue Univ., West Lafayette, IN, ²Utah State Univ., Logan, UT, ³Univ. of Missouri, Columbia, MO

Presentations: Poster/Infographic Displays

D3165 Evaluation of biorational insecticides against two-spotted spider mite (Acar: Tetranychidae) on tomato. **Gamze Mertoglu** (gzm0033@auburn.edu), Rammohan Rao Balusu and Henry Fadamiro, Auburn Univ., Auburn, AL

D3166 Integrating pest management for onion thrips and bacterial bulb rot in onion production. **Ashley Leach** (al2282@cornell.edu), Stephen Reiners and Brian Nault, Cornell Univ., Geneva, NY

D3167 Chemical control options at planting to control the Colorado potato beetle. **Pahoua Yang** (pahoua.yang@oregonstate.edu) and Silvia Rondon, Oregon State Univ., Hermiston, OR

D3168 Efficacy of a novel, reduced-risk insecticide for inducing mortality and changes in mobility for the post-harvest beetles, *Prostephanus truncatus* and *Sitophilus zeamais*. **Hannah Quellhorst** (hquellho@ksu.edu)¹, Frank Arthur² and William Morrison², ¹Kansas State Univ., Manhattan, KS, ²USDA - ARS, Manhattan, KS

D3169 Evaluation of optimal deployment of long-lasting insecticide-incorporated netting and semiochemicals against stored product insects around food facilities. **Rachel Wilkins** (rachwilk15@gmail.com)¹ and William Morrison², ¹Kansas State Univ., Manhattan, KS, ²USDA - ARS, Manhattan, KS

Grad Poster: P-IE, Plant Disease Vectors

Exhibit Hall 1 & 2 (America's Center)

D3170 Effects of water stress on transmission of '*Candidatus Liberibacter solanacearum*' pathogen by the vector *Bactericera cockerelli*. **Abigail Cohen** (abigail.cohen@wsu.edu) and David Crowder, Washington State Univ., Pullman, WA

D3171 Remaining vigilant on *Rice hoja blanca virus* and its insect vector *Tagosodes orizicolus*: A potential menace to Texas rice. **Jaclyn Martin** (jaclyn.martin@tamu.edu)¹, Estephanie Bernal Jimenez², Keyan Zhu-Salzman¹, Michael (Mo) Way³ and Ismael E. Badillo-Vargas¹, ¹Texas A&M Univ., College Station, TX, ²Texas A&M AgriLife Research, Weslaco, TX, ³Texas A&M AgriLife Research, Beaumont, TX

D3172 '*Candidatus Liberibacter solanacearum*' inhibits apoptosis in *Bactericera cockerelli* gut to facilitate its acquisition and transmission. **Xiaotian Tang** (tangxt@tamu.edu) and Cecilia Tamborindeguy, Texas A&M Univ., College Station, TX

D3173 Transcriptomic response of *Frankliniella occidentalis* guts to tomato spotted wilt virus infection. **Jinlong Han** (jhan8@ncsu.edu) and Dorith Rotenberg, North Carolina State Univ., Raleigh, NC

D3174 Development of the *Frankliniella fusca* (Hinds) draft genome. **Michael Catto** (mac65630@uga.edu)¹, Brendan Hunt² and Rajagopalbabu Srinivasan², ¹Univ. of Georgia, Athens, GA, ²Univ. of Georgia, Griffin, GA

D3175 Role of mealybugs in virus transmission in grapevines. **Pragya Chalise** (pragyac9@vt.edu) and Douglas G. Pfeiffer, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

D3176 Detection of corn leafhopper, *Dalbulus maidis*, a re-emerging invasive pest in South Texas. **Tara-Kay Jones** (jonestarakay1@tamu.edu)¹, Gabriela Esparza-Díaz², Astri Wayadande³ and Ismael E. Badillo-Vargas¹, ¹Texas A&M Univ., College Station, TX, ²Ameristem, Inc, Camarillo, CA, ³Oklahoma State Univ., Stillwater, OK

Grad Poster: P-IE, Pollinator

Exhibit Hall 1 & 2 (America's Center)

D3177 Pollinator diversity in northeastern Utah, a longitudinal study. **Mary-Kate Williams** (mfwilliams@aggiemail.usu.edu)¹, Frank Parker² and Diana Cox-Foster², ¹Utah State Univ., Logan, UT, ²USDA - ARS, Logan, UT

D3178 Pollinator-plant interaction networks and the effects of natural disturbances. **Nicole Martinez-Llaurador** (nicole.martinez14@upr.edu) and James Ackerman, Univ. of Puerto Rico, San Juan, PR

D3179 Impacts of landscape complexity and honey bee presence on wild bee community in a highly cultivated landscape. **Ashley St. Clair** (astclair@iastate.edu)¹, Adam Dolezal², Ge Zhang¹, Matthew O'Neal¹ and Amy Toth¹, ¹Iowa State Univ., Ames, IA, ²Univ. of Illinois, Champaign, IL

D3180 Different pan traps for sampling pollinators and beneficial arthropods in the livestock pasture ecosystem. **Roshani Sharma Acharya** (rsharmaa@uark.edu)¹, Emily Fitting², Joan Burke³ and Neelendra Joshi¹, ¹Univ. of Arkansas, Fayetteville, AR, ²Henderson State Univ., Arkadelphia, AR, ³USDA - ARS, Booneville, AR

D3181 The effects of increased yak and cattle grazing on bumble bee food plant assemblages in the Chinese Himalayas. **Alan Moss** (alan.j.moss@gmail.com)¹, Zong-Xin Ren² and Peter Bernhardt¹, ¹Saint Louis Univ., St. Louis, MO, ²Kunming Institute of Botany, Kunming, China

D3182 Understanding the influence of urbanization on native bee behavior, risk sensitivity, and pollination services. **Rachel Brant** (rabdxd@mail.umsl.edu) and Aimee Dunlap, Univ. of Missouri, St. Louis, MO

D3183 Behavioral variation and pollen choice in specialist bee *Ptilothrix bombiformis* across an urban to rural gradient. **Jennifer Mullikin** (jenny.mullikin@slu.edu), Retha Edens-Meier and Gerardo Camilo, Saint Louis Univ., St. Louis, MO

D3184 Pollinator assemblages of two early flowering trees differ at urban and rural sites. **Nina Fogel** (nina.fogel@slu.edu), Jennifer Mullikin, Alan Moss, Retha Edens-Meier, Gerardo Camilo and Peter Bernhardt, Saint Louis Univ., St. Louis, MO

D3185 Exploring the impact of prescribed fire on bumble bee nest initiation and foraging behavior. **Taylor Tai** (tmtai@wisc.edu) and Claudio Gratton, Univ. of Wisconsin, Madison, WI

D3186 Presentation withdrawn

D3187 *Melittobia* longevity in a managed *Megachile rotundata* system. **Alan Anderson** (alananderson4182@gmail.com)¹, Ricardo Ramirez¹, Theresa Pitts-Singer² and Earl Creech¹, ¹Utah State Univ., Logan, UT, ²USDA - ARS, Logan, UT

D3188 Women in beekeeping: A women-focused honey bee health and land management education program. **Bridget Gross** (bgross3@huskers.unl.edu), Judy Wu-Smart and Douglas Golick, Univ. of Nebraska, Lincoln, NE

Grad Poster: SysEB 1

Exhibit Hall 1 & 2 (America's Center)

D3189 Sexual dimorphism of antennal sensory structures in *Photinus pyralis*. **Yelena M. Pacheco** (yelena.marlese@gmail.com)¹, Joseph V. McHugh¹, Seth M. Bybee², Marc Branham³ and Kathrin Stanger-Hall¹, ¹Univ. of Georgia, Athens, GA, ²Brigham Young Univ., Provo, UT, ³Univ. of Florida, Gainesville, FL

Presentations: Poster/Infographic Displays

D3190 Generating morphological variation in honey bees: Effects on survival, behavior, and transcriptome. **Jacob Herman** (jherman@uncg.edu), Univ. of North Carolina, Greensboro, NC

D3191 Power amplification in click beetles: Kinematics and dynamics modeling of the jump. **Ophelia Bolmin** (obolmin2@illinois.edu), Alison Dunn, Aimy Wissa and Marianne Alleyne, Univ. of Illinois, Champaign, IL

D3192 Food and function: A study of host diet and nutritive capacities of symbiotic bacteria. **Christian Cabuslay** (csc97@drexel.edu)¹, Yi Hu², Catherine D'Amelio³, Benoit Bechade¹, Emma Kerr¹ and Jacob Russell¹, ¹Drexel Univ., Philadelphia, PA, ²Beijing Normal Univ., Beijing, PA, China, ³Univ. of Alaska, Anchorage, AK

D3193 Russian doll-style defensive diversity: Field dynamics of a protective endosymbiont and its bacteriophage. **Melissa Carpenter** (mc1356@scarletmail.rutgers.edu)¹, Stephanie Weldon², Andrew H. Smith³, Linyao Peng¹, Jonah Joffe¹, Kerry M. Oliver² and Jacob Russell¹, ¹Drexel Univ., Philadelphia, PA, ²Univ. of Georgia, Athens, GA, ³Rodale Institute, Kutztown, PA

D3194 Population genetics of *Sitophilus zeamais* in southern Mexico. **Jennifer Baltzegar** (jen_baltzegar@ncsu.edu) and Fred Gould, North Carolina State Univ., Raleigh, NC

D3195 Two new bumble bee genomes: *De novo* assembly of *Bombus bifarius* and *Bombus vosnesenskii* genomes from long and short read sequences. **Sam Heraghty** (sdheraghty@crimson.ua.edu)¹, Jeffrey Lozier¹, James Strange², John Sutton¹ and Rebecca Varney¹, ¹Univ. of Alabama, Tuscaloosa, AL, ²USDA - ARS, Logan, UT

D3196 Presentation withdrawn

D3197 DNA barcodes of weevils (Curculionoidea) in China: A review. **Zhuo Ma** (18600250520@163.com) and Runzhi Zhang, Chinese Academy of Sciences, Beijing, China

Grad Poster: SysEB 2

Exhibit Hall 1 & 2 (America's Center)

D3198 Task repertoires of hygienic workers reveals a link between specialized necrophoric behaviors in honey bees, *Apis mellifera*. **Adrian Perez** (arez@ucdavis.edu) and Brian Johnson, Univ. of California, Davis, CA

D3199 Scent of a woman: *Nasonia* males can seek out unborn virgin females. **Garima Prazapati** (garimaprazapati@gmail.com) and Rhitoban Raychoudhury, Indian Institute of Science Education and Research, Mohali, India

D3200 Sexual acoustic interactions in *Bertholdia trigona*: Duty cycle and female preference. **Yohami Fernandez Delgado** (fernny15@wfu.edu) and William E. Conner, Wake Forest Univ., Winston-Salem, NC

D3201 Neuroanatomical differentiation associated with alternative mate location strategies in the brains of dimorphic *Centris pallida* bees. **Meghan Barrett** (mrb397@drexel.edu), Virginia Caponera, Sophie Schneider, Rheanna Congdon, Purnima Sachdeva and Sean O'Donnell, Drexel Univ., Philadelphia, PA

D3202 Are *Laricobius* spp. (Coleoptera: Derodontidae) opportunistic fungal feeders? **Jeremiah Foley** (folejr@vt.edu)¹, Ariel Heminger¹, Tim Kring¹, Albert Mayfield², Brian Strahm¹ and Scott Salom¹, ¹Virginia Polytechnic Institute and State Univ., Blacksburg, VA, ²USDA - Forest Service, Asheville, NC

D3203 Maternal effects on offspring development in crop-pollinating bees, *Megachile rotundata*. **Makenna Johnson** (kennamay@gmail.com)¹, Theresa Pitts-Singer², Natalie Boyle² and Karen Kapheim¹, ¹Utah State Univ., Logan, UT, ²USDA - ARS, Logan, UT

D3204 Patterns of male mate choice across *Drosophila* species. **Haosu Cong** (conghaos@msu.edu) and Henry Chung, Michigan State Univ., East Lansing, MI

D3205 Out of the swamp and into the classroom: Bringing creature-collecting to Maryland youth. **Margaret Hartman** (mehartma@terpmail.umd.edu) and William Lamp, Univ. of Maryland, College Park, MD

D3206 The importance of gardens for urban butterfly conservation. **Lindsay Nason** (ldnas01@louisville.edu) and Perri Eason, Univ. of Louisville, Louisville, KY

D3207 The status of Dakota skipper (*Hesperia dacotae*) in eastern South Dakota. **Kendal Davis** (kendal.davis@sdsstate.edu) and Paul Johnson, South Dakota State Univ., Brookings, SD

D3208 A tale of two ecoregions: The impact of road-stream crossings on aquatic macroinvertebrates in the tall grass prairie and Ozark highland. **Melissa Reed** (mleath@okstate.edu), James Long and W. Wyatt Hoback, Oklahoma State Univ., Stillwater, OK

Grad Poster: SysEB 3

Exhibit Hall 1 & 2 (America's Center)

D3209 A new genus of pselaphine staphylinid beetles from Western Australia with descriptions of three new species (Coleoptera: Staphylinidae: Pselaphinae: Faronitae). **Su-Ho Choi** (pselaphitae@gmail.com)¹, Donald S. Chandler² and Jong-Seok Park¹, ¹Chungbuk National Univ., Cheongju, South Korea, ²Univ. of New Hampshire, Durham, NH

D3210 Revision of the genus *Bryaxis* Kugelann (Coleoptera: Staphylinidae: Pselaphinae) in Korea. **Yeon-Jae Choi** (duswo1002@gmail.com) and Jong-Seok Park, Chungbuk National Univ., Cheongju, South Korea

D3211 Exploration of the obscure diversity of spider beetles (Coleoptera: Ptinidae) in western South America. **Kyle Whorrall** (kyle.whorrall225@topper.wku.edu) and Keith Philips, Western Kentucky Univ., Bowling Green, KY

D3212 Survey of Wisconsin Tetratomidae (Coleoptera). **Jacquelyn Whisenant** (jacki.whisenant@gmail.com) and Daniel K. Young, Univ. of Wisconsin, Madison, WI

D3213 A survey of Tachyporinae of Wisconsin (Coleoptera: Staphylinidae). **Ann Marsh** (amarsh3@wisc.edu) and Daniel K. Young, Univ. of Wisconsin, Madison, WI

D3214 *Megacardiochiles*, a new genus of Cardiochilinae (Hymenoptera: Braconidae) from Malaysia, with description of a new species. **Ilgo Kang** (ikang1@lsu.edu), Louisiana State Univ., Baton Rouge, LA

D3215 Two new genera and four new species of Tingidae (Hemiptera) from Panama. **Alex Knudson** (alexander.knudson.2@ndsu.edu), David Rider and Janet Knodel, North Dakota State Univ., Fargo, ND

D3216 Nocturnal moth diversity across habitats at Fort Leonard Wood, Missouri. **James Allen** (jamestallen74@gmail.com) and Robin Verble, Missouri Univ. of Science and Technology, Rolla, MO

Presentations: Poster/Infographic Displays

D3217 Survey of butterflies at the Noxubee National Wildlife Refuge. **Jordan Gesell** (jlg684@msstate.edu), Mississippi State Univ., Mississippi State, MS

D3218 Active and abundant: Seasonal variation in butterfly communities in Arkansas prairies. **Grace Hirzel** (gehirzel@uark.edu) and Erica Westerman, Univ. of Arkansas, Fayetteville, AR

Undergrad Poster: MUVE 1

Exhibit Hall 1 & 2 (America's Center)

D3219 Regulation of the intake of iodide and phosphate by the eastern subterranean termite *Reticulitermes flavipes* (Kollar). **Tristan Burdette** (tburdette1s@semo.edu) and Timothy M. Judd, Southeast Missouri State Univ., Cape Girardeau, MO

D3220 A test for seasonal variation in levels of stored nutrients in the eastern subterranean termite *Reticulitermes flavipes* (Kollar). **Jacob Cadwell** (jacadwell1s@semo.edu) and Timothy M. Judd, Southeast Missouri State Univ., Cape Girardeau, MO

D3221 Effects of iron and molybdenum on the production of amino acids and protein in termites. **Landon Mitchell** (ljmitchell1s@semo.edu) and Timothy M. Judd, Southeast Missouri State Univ., Cape Girardeau, MO

D3222 Forensics and race: Melanin slows decomposition rates of rats. **Madeline Moore** (madeline.r.moore@okstate.edu) and W. Wyatt Hoback, Oklahoma State Univ., Stillwater, OK

D3223 Changing the formula benefits the mites: Grain mite response to dog food formulations. **Brandon Henriquez** (brandon.henriquez@okstate.edu), Ankur Limaje and W. Wyatt Hoback, Oklahoma State Univ., Stillwater, OK

D3224 *Bombyx mori* silk fibroin and insulin-like growth factor-1 as a repair factor to promote healing of diabetic wounds. **Meng-Jin Lin** (lmj@mndaia.gov.tw)^{1,2}, Mei-Chun Lu¹ and Hwan-You Chang², ¹Miaoli District Agricultural Research and Extension Station, Miaoli, Taiwan, ²National Tsing Hua Univ., Hsinchu, Taiwan

Undergrad Poster: MUVE 2

Exhibit Hall 1 & 2 (America's Center)

D3225 Determining the effects of flooded environments on deer ticks (*Ixodes scapularis*) and lone star ticks (*Amblyomma americanum*) (Acari: Ixodidae). **Kaniya Sandoval** (kaniya.sandoval@enmu.edu) and Sarah Kist, Eastern New Mexico Univ., Portales, NM

D3226 Characterization of viral communities carried by male and female Aedes mosquitoes collected in Houston. **David Brittain** (brittad@stthom.edu), Veit Tran, Alhasan Alshaaraf, Ayesha Hasan, Sused Silva, Arma Irfan, Franklin Pham, Sahyly Davalos, Martin Silguero, Maia Larios-Sanz and Rosemarie Rosell, Univ. of St. Thomas, Houston, TX

D3227 Effects of abscisic acid on *Anopheles stephensi* reproduction. **Reagan Haney** (reaganhs02@gmail.com), Dean Taylor and Shirley Luckhart, Univ. of Idaho, Moscow, ID

D3228 Investigation of fitness and flight behavior for *Aedes aegypti* using a flight mill. **Xavier Jimenez** (xaviermj@nmsu.edu), Yashoda Kandel, Charles Pelzman and Immo Hansen, New Mexico State Univ., Las Cruces, NM

D3229 Analyzing evolutionary changes in insecticide resistance of *Aedes aegypti* in the Rio Grande Valley. **Xochitl Estrada** (xochitl.estrada01@utrgv.edu) and Christopher Vitek, Univ. of Texas Rio Grande Valley, Edinburg, TX

D3230 The role of reactive oxygen species in the gut immune response of cat fleas (*Ctenocephalides felis*). **Clark Hall** (ch09950@georgiasouthern.edu) and Lisa D. Brown, Georgia Southern Univ., Statesboro, GA

Undergrad Poster: PBT 1

Exhibit Hall 1 & 2 (America's Center)

D3231 Let me out: Effects of offspring cell position on emergence patterns of solitary, cavity-nesting bee, *Megachile rotundata*. **Korie Debardlabon** (korie.debardlabon.1@ndsu.edu)^{1,2}, Elise Spears³, George Yocum², Joseph P. Rinehart² and Kendra Greenlee¹, ¹North Dakota State Univ., Fargo, ND, ²USDA - ARS, Fargo, ND, ³Davies South High School, Fargo, ND

D3232 Determining the efficacy of an alternative treatment method for *Nosema* spp. control in honey bee (*Apis mellifera*) colonies. **Soledad Cantu** (sgc42@tamu.edu), Pierre Lau and Juliana Rangel, Texas A&M Univ., College Station, TX

D3233 Determining the effects of nutrition on honey bee (*Apis mellifera*) pathogen defense against Deformed Wing Virus. **Jordan Gomez** (jordangomez363@tamu.edu), Alexandria Payne, Pierre Lau, Cora Garcia, Pierre Lesne, Spence Behmer and Juliana Rangel, Texas A&M Univ., College Station, TX

D3234 Temporal dynamics of field recruitment to three major macronutrients in an urban ant community. **Alexandria Strawn** (alexandria.strawn@tamu.edu), Pierre Lesne, Richelle Marquess and Spence Behmer, Texas A&M Univ., College Station, TX

D3235 Lipid preferences in laboratory maintained colonies of the red imported fire ant (*Solenopsis invicta*). **Sabrina Quintanilla** (quintsv188@tamu.edu), Pierre Lesne, Richelle Marquess and Spence Behmer, Texas A&M Univ., College Station, TX

D3236 Presentation withdrawn

D3237 Immunological priming for bacterial strain specific effects in ants. **Minahil Sami** (minahil.sami@scranton.edu) and Marc Seid, The Univ. of Scranton, Scranton, PA

Undergrad Poster: PBT 2

Exhibit Hall 1 & 2 (America's Center)

D3238 Quantifying *Pseudomonas aeruginosa* prevalence in the locust species, *Schistocerca cancellata*. **Valerie Murphy** (vamurph@siue.edu) and Brittany Peterson, Southern Illinois Univ., Edwardsville, IL

D3239 Investigating the role of the microbiome in *Schistocerca cancellata* behavioral plasticity. **Blessing Udo** (eudoh@siue.edu) and Brittany Peterson, Southern Illinois Univ., Edwardsville, IL

D3240 Daily macronutrient requirements during the final juvenile instar in the Australian plague locust, *Chortoicetes terminifera*. **Ruth Farington** (rfaringt@asu.edu), Stephen Rogers and Arianne Cease, Arizona State Univ., Tempe, AZ

D3241 Antibacterial effects of cicada wing-inspired engineered surfaces in practical settings. **Ayomide Averehi** (aavere2@illinois.edu)¹, Junho Oh¹, Nenad Miljkovic¹, Donald M. Cropek², James Lowe¹ and Marianne Alleyne¹, ¹Univ. of Illinois, Champaign, IL, ²US Army, Champaign, IL

D3242 The contribution of Williams Syndrome-related genes to *Drosophila* social behaviors reveals an evolutionarily conserved genetic toolkit underlying animal sociality. **Iris Chin** (irischin@wustl.edu), Cassandra Vernier and Yehuda Ben-Shahar, Washington Univ., St. Louis, MO

Presentations: Poster/Infographic Displays

D3243 Toluene exposure and the resulting toxicity effects on fly fecundity and offspring development in *Drosophila melanogaster*. **Dalia Arredondo** (darredo@stthom.edu), Emaad Ullah, Brenda Luu, Francisco Lopez, Angela Moreno, Mary Campanas, Kim Nguyen, Gabrielle King and Rosemarie Rosell, Univ. of St. Thomas, Houston, TX

Undergrad Poster: P-IE 1

Exhibit Hall 1 & 2 (America's Center)

D3244 Critical decline in insect population! **Anusha Vaish** (anusha@saveinsects.com), Anne Hutchinson Elementary School, Eastchester, NY

D3245 The diversity and abundance of bees and wasps using trap nests in urban environments in Bozeman, Montana. **Joshua Botti-Anderson** (6BA26Josh12@gmail.com), Casey Delphia, Laura Burkle and Kevin O'Neill, Montana State Univ., Bozeman, MT

D3246 Diversity of *Lasioglossum* bees in prairie and forest habitat in the Driftless Region of Eastern Iowa. **Isabella Metcalf** (imetcalf@dbq.edu)¹, Adam Hoffman¹ and Stephen Hendrix², ¹Univ. of Dubuque, Dubuque, IA, ²Univ. of Iowa, Iowa City, IA

D3247 Pollinator assemblages across different levels of landscape development in the Post Oak Savannah ecoregion. **Ruth Harrison** (ruthhharrison17@tamu.edu), Pierre Lau, Karen Wright and Juliana Rangel, Texas A&M Univ., College Station, TX

D3248 Richness, turnover, and abundance patterns of wild bees (Hymenoptera: Anthophila) in an ecodiversity hotspot. **Jenna Crowder** (jlcrowd@g.clemson.edu), Clemson Univ., Clemson, SC

D3249 Comparison of native bee and honeybee floral preferences for pollinator conservation. **Brandon Herron** (bh0026@bravemail.uncp.edu), Cody Eubanks and Kaitlin Campbell, Univ. of North Carolina, Pembroke, NC

D3250 Examination of pollinator gardens in regard to combating decline of local bee populations. **Cody Eubanks** (cbe007@bravemail.uncp.edu), Brandon Herron, Abigail Canea and Kaitlin Campbell, Univ. of North Carolina, Pembroke, NC

D3251 Assessing effectiveness of urban gardens as suitable habitat for monarch butterfly, *Danaus plexippus*. **Claire Ballman** (claire.ballman@slu.edu)¹ and Gerardo Camilo², ¹Saint Louis Univ., Ballwin, MO, ²Saint Louis Univ., St. Louis, MO

D3252 Do milkweed nativars ecologically benefit monarch butterflies? **Helena Cybriwsky** (hecy222@uky.edu), D. Bailey Riordan, Adam Baker and Daniel Potter, Univ. of Kentucky, Lexington, KY

D3253 Are the aphids (*Aphis nerii*) in your pollinator garden a detriment to monarch butterflies (*Danaus plexippus*)? **D. Bailey Riordan** (dbriordan@uky.edu), Helena Cybriwsky, Adam Baker and Daniel Potter, Univ. of Kentucky, Lexington, KY

D3254 Presentation withdrawn

Undergrad Poster: P-IE 2

Exhibit Hall 1 & 2 (America's Center)

D3255 Lethality effects of pistachio pumpkin and saffron petals essential oils on larvae of *Plodia interpunctella* (Hubner) in laboratory conditions. **Reza Sadeghi** (rsadeghi@ut.ac.ir), Mostafa Mirzaei and Arsalan Jamshidnia, Univ. of Tehran, Tehran, Iran (Islamic Republic of)

D3256 Efficacy of Storicide II on pests of stored rice. **Nicholas Van Pelt** (nicholas.vanpelt@usda.gov), Frank Arthur, Alison Gerken and Erin Scully, USDA - ARS, Manhattan, KS

D3257 Trapping and behavioral response of *Eucosma giganteana* to semiochemicals exhibiting congeneric attraction to other *Eucosma* spp. (Lepidoptera: Pyralidae) in novel *Silphium* agroecosystems. **Kaitlyn Ruiz** (kpruiz@ksu.edu)¹, Ebony Murrell² and William Morrison³, ¹Kansas State Univ., Manhattan, KS, ²The Land Institute, Salina, KS, ³USDA - ARS, Manhattan, KS

D3258 Behavioral response of the post-harvest biocontrol agent, *Theocolax elegans* (Westwood) (Hymenoptera: Pteromalidae), to volatile stimuli depends on natal host environment. **Chloe Albin** (chloeealbin@gmail.com)¹ and William Morrison², ¹Kansas State Univ., Manhattan, KS, ²USDA - ARS, Manhattan, KS

D3259 Interactions between the microbial and insect community affect grain quality in the post-harvest environment. **Marco Ponce** (marco.ponce15@kzoo.edu)¹ and William Morrison², ¹Kalamazoo College, Kalamazoo, MI, ²USDA - ARS, Manhattan, KS

D3260 Does planting density influences granivory in polyculture systems? **Hayden Bock** (hwb5138@psu.edu), Julie Baniszewski, Mary Ann Bruns and John Tooker, Pennsylvania State Univ., University Park, PA

D3261 Trap design, but not conspecific cuticular hydrocarbon extracts, alter the behavioral response of young and old warehouse beetle, *Trogoderma variable* (Coleoptera: Dermestidae) larvae. **Robert Grosdidier** (rlgrosd@ksu.edu)¹, Michael Domingue² and William Morrison³, ¹Kansas State Univ., Manhattan, KS, ²USDA - APHIS, Buzzards Bay, MA, ³USDA - ARS, Manhattan, KS

D3262 Seasonal mating status and ovary development in Minnesota populations of *Drosophila suzukii* (Diptera: Drosophilidae). **Izzy Bur** (burxx008@umn.edu), Eric C. Burkness and William D. Hutchison, Univ. of Minnesota, St. Paul, MN

D3263 Trait-based and taxonomic-based analysis of macroinvertebrate community integrity in urban and agricultural-dominated Midwest watersheds. **Ryan Johnson** (ryanjohnson16@augustana.edu) and Kevin Geedey, Augustana College, Rock Island, IL

D3264 Bioactivity of Anonaceae ethanolic extracts on *Leucoptera coffeella* (Lepidoptera: Lyonetiidae). **Jéssica Gorri** (gorrijer@gamil.com), Thais Bernini and Edson Baldin, Univ. Estadual Paulista, Botucatu, Brazil

D3265 Do urban habitats provide prey resources for lady beetles? **Johnathan Milligan** (jmilligan1225@mail.snu.edu)¹, Jackson Winslow¹, David Hoekman¹, Benjamin Juliano², Tania N. Kim³, Brian Spiesman³ and Claudio Gratton², ¹Southern Nazarene Univ., Bethany, OK, ²Univ. of Wisconsin, Madison, WI, ³Kansas State Univ., Manhattan, KS

Undergrad Poster: P-IE 3

Exhibit Hall 1 & 2 (America's Center)

D3266 Influence of termination timing of winter cover crops on insect pest abundance in Midsouth cotton. **Jessica Krob** (jessica.krob@smail.astate.edu)¹, Andrew Baker² and Tina Gray Teague¹, ¹Arkansas State Univ., State Univ., AR, ²Univ. of Arkansas, State Univ., AR

D3267 Resistance selection and susceptibility of corn earworm in the U.S. southeast region to Vip3A protein. **Wenbo Yu** (wyu14@lsu.edu)¹, Isaac/Olatunji Oyediran², Ying Niu¹, Marcelo Dimase¹, Jianguo Guo¹, Francis Reay-Jones³, Don Cook⁴, Sebe Brown⁵, Xinzhi Ni⁶, Dominic Reisig⁷, Silvana Paula-Moraes⁸ and Fangneng Huang¹, ¹Louisiana State Univ., Baton Rouge, LA, ²Syngenta Biotechnology Inc, Research Triangle Park, NC, ³Clemson Univ., Florence, SC, ⁴Mississippi State Univ., Stoneville, MS, ⁵Louisiana State Univ., Winnboro, LA, ⁶USDA - ARS, Tifton, GA, ⁷North Carolina State Univ., Plymouth, NC, ⁸Univ. of Florida, Jay, FL

Presentations: Poster/Infographic Displays

D3268 Sorghum tolerance to phloem-feeding aphids. **Earl Agpawa** (eagpawa2@unl.edu), Sajjan Grover and Joe Louis, Univ. of Nebraska, Lincoln, NE

D3269 Assessing the effects of ant-aphid interactions on grain sorghum health. **Jose Torres** (jose.torres@tamu.edu), Jocelyn R. Holt and Raul F. Medina, Texas A&M Univ., College Station, TX

D3270 Evaluating the movement and infestation potential of soybean gall midge larvae. **Genereuse Turabawe** (gturabawe2@huskers.unl.edu)¹, Débora Goulart Montezano¹ and Anthony McMechan², ¹Univ. of Nebraska, Lincoln, NE, ²Univ. of Nebraska, Ithaca, NE

D3271 *Spodoptera frugiperda* populations from the Florida Panhandle: Phenology of occurrence and carbon isotopic signatures. **Phillip Bann** (phillipbann@gmail.com), Silvana Paula-Moraes and Latisa Ledbetter-Kish, Univ. of Florida, Jay, FL

D3272 Sampling, trapping, and pesticide efficacy for snails in the Florida panhandle. **Christopher Hemphill** (chemphill@ufl.edu), Marcelo Rabelo and Silvana Paula-Moraes, Univ. of Florida, Jay, FL

D3273 Organic cucumber variety trial for resistance to common pests. **Joshua Villa** (jvilla4227@gmail.com) and Kaitlin Campbell, Univ. of North Carolina, Pembroke, NC

D3274 Feeding behavior of *Brevicoryne brassicae* in resistant and susceptible collard green genotypes. **Matheus Sacilotto** (mgsacilotto@gmail.com), Vinícius Canassa and Edson Luiz Baldin, Univ. Estadual Paulista, Botucatu, Brazil

Undergrad Poster: SysEB 1

Exhibit Hall 1 & 2 (America's Center)

D3275 Giant reed mulch and arthropod diversity. **Skylar Primavera** (skylarprimavera@gmail.com) and Charlie Braman, Univ. of California, Santa Barbara, CA

D3276 Arthropod biodiversity of two distinct zones of Fern Forest Preserve and Nature Center in the greater Everglades ecosystem. **Christopher Stauffer** (stauc1@mail.broward.edu), David Serrano, Giovanna Ortiz and Brandon Dilella, Broward College, Davie, FL

D3277 Ground beetle communities of Anderson Prairie and Lionberger Forest Preserve. **Magdelene Anderson** (andema34@luther.edu) and Kirk J. Larsen, Luther College, Decorah, IA

D3278 A survey of bee (*Anthophila*) biodiversity in Richmond, Virginia. **Robert Ostrom** (robert.ostrom@richmond.edu), Lily Thompson and Kristine Grayson, Univ. of Richmond, Richmond, VA

D3279 Spotting bee diversity: Testing the quality of citizen science photo survey data. **Lisa Danback** (lisadanback10@webster.edu)¹, Nicole Miller -Struttmann¹ and Gerardo Camilo², ¹Webster Univ., Webster Groves, MO, ²Saint Louis Univ., St. Louis, MO

D3280 Describing the natural enemy community associated with *Andricus foliatus* galls on two host tree species *Quercus geminata* and *Quercus virginiana*. **Charles Davis** (ckd3@rice.edu)¹, Scott Egan¹, Andrew Forbes², Linyi Zhang¹ and Elaine Hu¹, ¹Rice Univ., Houston, TX, ²Univ. of Iowa, Iowa City, IA

D3281 Ants of northern Yellowstone National Park: A survey of biodiversity. **Miles Maxcer** (milesjmax@gmail.com)¹, Erik Oberg² and Robert Peterson¹, ¹Montana State Univ., Bozeman, MT, ²US National Park Service, Yellowstone National Park, WY

D3282 Surface-active ant diversity following a prescribed fire in a ponderosa pine forest in Jemez Springs, New Mexico. **Randie Rogers** (rارتbb@mst.edu)¹, Robert R. Parmenter², Theodore Sumnicht³ and Robin Verble¹, ¹Missouri Univ. of Science and Technology, Rolla, MO, ²Valles Caldera Trust, Jemez Springs, NM, ³Missouri Univ. of Science and Technology, Newburg, MO

D3283 Moths of oak-hickory forests and planted tallgrass prairies in Luther College's natural areas. **Lena Schmitt** (schmle01@luther.edu) and Kirk Larsen, Luther College, Decorah, IA

Undergrad Poster: SysEB 2

Exhibit Hall 1 & 2 (America's Center)

D3284 A new predaceous diving beetle (Coleoptera: Dytiscidae) from the Lower Cretaceous Crato Formation of Brazil. **Harmen Alleyne** (halleyen2@illinois.edu)¹, M. Jared Thomas² and Sam W. Heads², ¹Univ. of Illinois, Champaign, IL, ²Illinois Natural History Survey, Champaign, IL

D3285 Taxonomic review of the water beetle genus *Chasmogenus* Sharp of Venezuela and the Guianas (Coleoptera: Hydrophilidae: Acidocerinae). **Rachel Smith** (rr.smith816@ku.edu) and Andrew Short, The Univ. of Kansas, Lawrence, KS

D3286 A glowing guide to *Atypella* Olliff (Coleoptera: Lampyridae) in the South Pacific. **Laura Sutherland** (lsutherland5@gmail.com), Natalie Saxton, Gareth Powell and Seth M. Bybee, Brigham Young Univ., Provo, UT

D3287 Key to common ants of Alaska based on adult workers. **Renee Nowicki** (rknowicki@alaska.edu), Univ. of Alaska, Fairbanks, AK

D3288 Lessons from the past: Discovery of the earliest known fossil of Eulophidae and its evolutionary implications. **Tiffany Domer** (tdome001@ucr.edu), Taylor Stoker, Roger A. Burks and John M. Heraty, Univ. of California, Riverside, CA

D3289 We're related?! Using COI barcodes to match sexually dimorphic Bethylidae and Dryinidae (Hymenoptera: Chrysidoidea). **Mick Mitchell** (mitcmn@farmingdale.edu) and Carly Tribull, Farmingdale State College, Farmingdale, NY

D3290 Evaluating the Japanese Trichoptera DNA barcode database. **Samuel Bennett** (sambennettslc@gmail.com)¹, Akito Kawahara² and Paul Frandsen³, ¹Brigham Young Univ., Holladay, UT, ²Univ. of Florida, Gainesville, FL, ³Brigham Young Univ., Provo, UT

D3291 Genetic differentiation in maize weevil populations in Oaxaca and Chiapas, Mexico. **Destiny Tyson** (dntyson@ncsu.edu), North Carolina State Univ., Durham, NC

D3292 Biogeographic patterns of the stick insects (Insecta: Phasmatodea) of Vanuatu. **Jackson Linde** (jacksonlinde35@gmail.com)¹, Yelena M. Pacheco², James A. Robertson³, Sven Bradler⁴, Seth M. Bybee¹ and Michael F. Whiting¹, ¹Brigham Young Univ., Provo, UT, ²Univ. of Georgia, Athens, GA, ³USDA - APHIS, Beltsville, MD, ⁴Georg-August-Univ., Göttingen, Germany

Undergrad Poster: SysEB 3

Exhibit Hall 1 & 2 (America's Center)

D3293 Exploring the ancestral role of the transcription factor *Anterior-open* (*Aop*) in insect eye development. **Claudio Velardo** (cv1366@desales.edu) and Auster Barnett, DeSales Univ., Center Valley, PA

Presentations: Poster/Infographic Displays

D3294 Interrogating the ancestral role of EGF ligands in *Oncopeltus fasciatus* oocyte development. **Veronika Tews** (vt7905@desales.edu) and Austen Barnett, DeSales Univ., Center Valley, PA

D3295 Back to basics: Environmental factors for the endemic helikopters of Vanuatu (Odonata: Coenagrionidae). **Abigail Moon Dean** (abigail.lua.dean@gmail.com) and Seth M. Bybee, Brigham Young Univ., Provo, UT

D3296 An analysis of Chironomidae along a sub-Antarctic altitudinal gradient. **Katherine Cline** (katherinecline@my.unt.edu)¹, Tamara Contador^{2,3,4,5}, James Kennedy^{1,3,4,6}, Taylor Gillum¹ and Sabrina Moore¹, ¹Univ. of North Texas, Denton, TX, ²Instituto de Ecología y Biodiversidad, Santiago, Chile, ³Univ. de Magallanes, Punta Arenas, Chile, ⁴Parque Etnobotánico Omora, Puerto Williams, Chile, ⁵Sub-Antarctic Biocultural Conservation Program, Punta Arenas, Chile, ⁶Sub-Antarctic Biocultural Conservation Program, Denton, TX

D3297 The American burying beetle co-exists with a burying beetle brood parasite. **Mason Taylor** (masonta@okstate.edu)¹, Melissa Reed² and W. Wyatt Hoback², ¹Oklahoma State Univ., Perry, OK, ²Oklahoma State Univ., Stillwater, OK

D3298 An investigation of carrion beetles (Coleoptera: Silphidae) as indicators of urban forest health. **Gregory Middleton** (gregorymiddleton16@augustana.edu), Tierney R. Brosius and Michael Reisner, Augustana College, Rock Island, IL

D3299 Elevation and mean winter temperatures differentially impact the distribution of two non-native mason bee species (genus *Osmia*) across the Commonwealth of Virginia. **Nayoung Lee** (nl3nr@virginia.edu)¹, Kathryn LeCroy¹ and T'ai Roulston², ¹Univ. of Virginia, Charlottesville, VA, ²Univ. of Virginia, Boyce, VA

D3300 The buzz on bacteria and the bacteria on the buzz. **Elizabeth Bello** (bellea@farmingdale.edu) and Carly Tribull, Farmingdale State College, Farmingdale, NY

Student Virtual Infographic: All Sections

Exhibit Hall 1 & 2 (America's Center)

VP01 Tick-tock it's time for tick talk. **Katherine Bowman** (katherinebowman17@gmail.com), Saint Louis Univ., Lebanon, IL

VP02 Hygienic behavior in the honeybee (*Apis mellifera*): What is the paternal contribution? **Rya Seltzer** (ryaseltzer@gmail.com)^{1,2}, Yosef Kamer¹, Ilia Zaidman¹, Paz Kahanov¹, Małgorzata Bierńska³, Abraham Hefetz² and Victoria Soroker¹, ¹Agricultural Research Organization, The Volcani Center, Rishon LeZion, Israel, ²Tel Aviv Univ., Tel Aviv, Israel, ³Institute of Horticulture, Puławy, Poland

VP03 Spatial and seasonal patterns of *Ophryocystis elektroscirrha* infection severity in coastal populations of monarch butterflies (*Danaus plexippus*). **Christen Steele** (csteele3@tulane.edu), Tulane Univ., New Orleans, LA

VP04 Mangrove herbivory across a salinity gradient. **Kristin Jayd** (kjayd@terpmail.umd.edu)¹, Richard MacKenzie², Maybeleen Apwong³ and Daniel Gruner¹, ¹Univ. of Maryland, College Park, MD, ²USDA - Forest Service, Hilo, HI, ³Univ. of Hawai'i, Hilo, HI

Grad Virtual Poster: MUVE, PBT, and SysEB

Exhibit Hall 1 & 2 (America's Center)

VP05 Chigger mites (Trombidiformes: Trombiculidae) parasitizing birds in Brazil, with notes on *Rickettsia* detection. **Ricardo Bassini-Silva** (ricardo.bassini@gmail.com)¹, Fernando Jacinavicius², Cal Welbourn³, Ronald Ochoa⁴ and Darci Barros-Battesti⁵, ¹Univ. de São Paulo, São Paulo, Brazil, ²Laboratório Especial de Coleções Zoológicas, São Paulo, Brazil, ³Florida State Collection of Arthropods, Gainesville, FL, ⁴USDA - ARS, Beltsville, MD, ⁵Univ. Estadual Paulista, Jaboticabal, Brazil

VP06 Assessing virulence of *Beauveria bassiana* against adult house flies (*Musca domestica*). **Roxie White** (roxie.white@usda.gov)^{1,2}, Christopher Geden¹ and Phillip Kaufman², ¹USDA - ARS, Gainesville, FL, ²Univ. of Florida, Gainesville, FL

VP07 Management practices of Florida deer farmers for *Culicoides* and other arthropods. **Laura Harmon** (larharmon@ufl.edu)¹, Katherine Sayler¹, Nathan Burkett-Cadena², Samantha Wisely¹ and Emma Weeks¹, ¹Univ. of Florida, Gainesville, FL, ²Univ. of Florida, Vero Beach, FL

VP08 Food level influence on spinosad efficacy in container-developing mosquitoes. **Andrew Branch** (andrew.branch@ufl.edu), Blair Siegfried and Phillip Kaufman, Univ. of Florida, Gainesville, FL

VP09 Effects of low rate transfluthrin exposures on male and female *Aedes albopictus* (Skuse). **Sean McKay** (mckays@ufl.edu), Jeffrey Bloomquist and Phillip Kaufman, Univ. of Florida, Gainesville, FL

VP10 Influence of host-plants on nutrition and gut proteolytic digestion in two populations of *Pieris brassicae* L. from Kashmir and Delhi, India. **Tabasum Akhter** (tabasum87@gmail.com), Pawan Kumar and Sudeshna Mazumdar-Leighton, Univ. of Delhi, Delhi, India

VP11 Mechanical damping of insect antennae. **Marlo McCarter** (marlom@uci.edu) and Catherine Loudon, Univ. of California, Irvine, CA

VP12 Effects of parasitic infection and rearing temperature on the wing morphology of adult eastern migratory monarch butterflies (*Danaus plexippus*). **Caitlin Ducat** (cducat@tulane.edu)¹, Christen Steele¹, Andy Davis² and Caz Taylor¹, ¹Tulane Univ., New Orleans, LA, ²Univ. of Georgia, Athens, GA

VP13 Catalogue of types of the Smithsonian National Chigger Collection of the National Museum of Natural History. **Ricardo Bassini-Silva** (ricardo.bassini@gmail.com)¹, Fernando Jacinavicius², Cal Welbourn³, Ronald Ochoa⁴, Debra Creel⁴ and Darci Barros-Battesti⁵, ¹Univ. de São Paulo, São Paulo, Brazil, ²Laboratório Especial de Coleções Zoológicas, São Paulo, Brazil, ³Florida State Collection of Arthropods, Gainesville, FL, ⁴USDA - ARS, Beltsville, MD, ⁵Univ. Estadual Paulista, Jaboticabal, Brazil

VP14 Artificial selection of plants promotes temporal reproductive isolation in insect population: A test case using highbush blueberry and the blueberry stem gall wasp. **Michael Sergeant** (sergeantmike@wayne.edu)¹, Philip Fanning², Rufus Isaacs² and Glen Hood¹, ¹Wayne State Univ., Detroit, MI, ²Michigan State Univ., East Lansing, MI

VP15 Diversity of native stingless bees (Apidae: Meliponini) pollinators of açai (*Euterpe oleracea* Mart.) in eastern Amazônia, Brazil. **Tiago da Costa** (tiago_sc@hotmail.com), Vinícius Fonseca, Camila Pinto, Vinícius Costa and Raimundo Nonato Souto, Univ. Federal do Amapá, Amapá, Brazil

VP16 Grubs for dinner: How *Cotinis mutabilis* grubs can be a sustainable and economic protein source. **Meck Slagle** (mslagle@email.arizona.edu) and Goggy Davidowitz, Univ. of Arizona, Tucson, AZ

Presentations: Poster/Infographic Displays

Grad Virtual Poster: P-IE

Exhibit Hall 1 & 2 (America's Center)

VP17 PCR-based detection of *Nosema* sp. in commercial Tasar silkworm *Antherea mylitta* from Central India. **Parul Bhardwaj** (paruljune1991@gmail.com)¹, C. R. Babu¹, Satyabrata Acharyya², Md. Shamshad Alam³ and Sudeshna Mazumdar-Leighton¹, ¹Univ. of Delhi, Delhi, India, ²Professional Assistance for Development Action, New Delhi, India, ³Tasar Development Foundation, Jharkhand, India

VP18 Pollinator efficiency in Australian apple crops: Single visit experiment and pollen analysis. **Olivia Bernauer** (olivia.bernauer@gmail.com), Simon Tierney and James Cook, Western Sydney Univ., Richmond, NSW, Australia

VP19 Potential use of local strains of entomopathogenic fungus to control the coconut rhinoceros beetle, *Oryctes rhinoceros*, on Oahu, Hawai'i. **Mason Russo** (rusomas@hawaii.edu)¹, Zhiqiang Cheng¹, Jing Li², Kelsey Mitsuda¹ and Matthew Kellar¹, ¹Univ. of Hawaii, Honolulu, HI, ²Hebei Agricultural Univ., Hebei, China

VP20 Mating and reproductive performance of *Propylea dissecta* (Mulsant): Effect of larval, adult food regime. **Priya Singh** (priyariea@gmail.com), Geetanjali Mishra and Omkar Omkar, Univ. of Lucknow, Lucknow, India

VP21 Does cannibalism affects mating preferences and reproductive fitness in *Menochilus sexmaculatus* Fabricius (Coleoptera: Coccinellidae)? **Tripti Yadav** (triptiyadav3108@gmail.com), Omkar Omkar and Geetanjali Mishra, Univ. of Lucknow, Lucknow, India

VP22 Thrips: Never too far from wildflowers snacks! Effect of distance from uncultivated field margins on *Frankliniella* spp. (Thysanoptera: Thripidae) density distribution in strawberry fields. **Morgane Canovas** (morgane.canovas.1@ulaval.ca), Jean-Frédéric Guay, Valérie Fournier and Conrad Cloutier, Univ. Laval, Québec City, QC, Canada

VP23 Bioassays of entomopathogenic fungi against *Melanaphis sacchari*. Karla Cruz-Aldaco¹, **Gabriela Esparza-Díaz** (gesparza@ameristem.com)², Raul T. Villanueva³ and Sergio Sánchez-Peña¹, ¹Univ. Autónoma Agraria Antonio Narro, Saltillo, CU, Mexico, ²Ameristem, Inc, Camarillo, CA, ³Univ. of Kentucky, Princeton, KY

VP24 Trunk injection of insecticides for pear psylla management. **Celeste Wheeler** (wheel243@msu.edu)¹ and John Wise², ¹Michigan State Univ., Fennville, MI, ²Michigan State Univ., East Lansing, MI

VP25 Detection and identification of lethal bronzing disease non-palm reservoirs in Florida palm agroecosystems. **Lidia Komondy** (lkomondy@ufl.edu), Melody Bloch, Ericka Helmick and Brian Bahder, Univ. of Florida, Davie, FL

VP26 Teamwork makes the dream work: Evaluation of interdisciplinarity between the fields of invasion ecology and biocontrol using scientometrics. **Ashley Schulz** (ashley.schulz@smail.astate.edu)¹, Rima Lucardi² and Travis D. Marsico¹, ¹Arkansas State Univ., Jonesboro, AR, ²USDA - Forest Service, Athens, GA

Undergrad Virtual Poster: MUVE, PBT, and SysEB

Exhibit Hall 1 & 2 (America's Center)

VP27 Techniques for detecting dog heartworm in competent mosquito vectors. **Nicole Abruzzo** (nabruzzo@ufl.edu), Emma Weeks, Caitlin Taylor and Phillip E. Kaufman, Univ. of Florida, Gainesville, FL

VP28 *Bactericera cockerelli* (Hemiptera: Triozidae) repellency to plastic foil with basil essential oil (*Ocimum basilicum*) integrated by nanotechnology. **Agustín Hernández-Juárez** (chinoahj14@hotmail.com)¹, Juan Mayo-Hernández¹, María Hernández-Araiza¹, Ernesto Cerna¹, Luis Aguirre¹ and Julio Chacón-Hernández², ¹Univ. Autónoma Agraria Antonio Narro, Saltillo, CU, Mexico, ²Univ. Autónoma de Tamaulipas, Ciudad Victoria, TM, Mexico

VP29 General esterase activity of monarch butterflies (*Danaus plexippus*) exposed to pyrethroid insecticides. **Haley Moyer** (hlm5009@lockhaven.edu)^{1,2}, Annie Krueger², Thomas Weissling², Ana Vélez² and Troy Anderson², ¹Lock Haven Univ., Lock Haven, PA, ²Univ. of Nebraska, Lincoln, NE

VP30 Structural analysis of LhetKNOT, a venom peptide of *Drosophila* parasitoid, *Leptopilina heterotoma*, reveals potential role of heparin-binding structural motif in antimicrobial activity of knottin proteins. **Joseph Arguelles** (joseph.arguelles21@bcmail.brooklyn.cuny.edu)¹, Shubha Govind² and Shaneen Singh¹, ¹City Univ. of New York, Brooklyn, NY, ²City Univ. of New York, New York, NY

VP31 New records of *Melanaethus spinolae* (Signoret, 1864) (Hemiptera: Cydnidae) from insular Chile. **Catalina Vargas** (catalina.vrgs.ruiz@gmail.com)¹, Eduardo Faundez² and Mariom Carvajal², ¹Univ. de Magallanes, Punta Arenas, Chile, ²North Dakota State Univ., Fargo, ND

VP32 You spin silk right round: An examination of genetic variation in silk genes of Lepidoptera. **Rebeccah Messcher** (rmessche@ufl.edu), Akito Kawahara and Caroline Storer, Univ. of Florida, Gainesville, FL

VP33 Rapid identification of an impending invasive, *Tuta absoluta*, from diverse insect communities using metabarcoding. **Hailey Dansby** (hailey.dansby@ufl.edu)¹, Craig Bateman¹, W. Braswell² and Akito Kawahara¹, ¹Univ. of Florida, Gainesville, FL, ²USDA - ARS, Edinburg, TX

VP34 Transgenic corn Agrisure® Viptera™ 3111 effect over non-target parasitoids abundance in Sinaloa, Mexico. **Luis Aguirre** (luisaguirre@yahoo.com.mx), Agustín Hernández-Juárez, Mariano Flores, Ernesto Cerna, Yisa Ochoa and Edgar Guzman, Univ. Autónoma Agraria Antonio Narro, Saltillo, CU, Mexico

VP35 Isolation and identification of entomopathogenic nematodes from selected areas in Lanao del Norte, Philippines and their infectivity against *Zophobas morio* (Coleoptera: Tenebrionidae). April Lyn Leonor and **Nanette Hope Sumaya** (nanettehope.sumaya@g.msuiit.edu.ph), Mindanao State Univ. Iligan Institute of Technology, Iligan City, Philippines

VP36 Identification of novel genetic markers in two edible caterpillars of Southern Africa, *Gonimbrasia belina* and *Gynanisa maja*, based on mitochondrial genomes. **Jethro Langley** (20004990@sun.ac.za)¹, Morgan Cornwall¹, Gail Morland² and Barbara van Asch¹, ¹Stellenbosch Univ., Stellenbosch, South Africa, ²Namibia Univ. of Science and Technology, Windhoek, Namibia

VP37 Montana-grown whole wheat cricket bread evaluated for polyunsaturated fatty acids, protein, human sensory response, and rheological/baking properties. **Yuxiao Lyu** (yuxiaolyu@gmail.com), Ruiping Fang, Florence Dunkel, Michael Giroux, Rachel Johnston, Huang Li, Chaofu Lu, Harvey Teslak and Yigit Sagiroglu, Montana State Univ., Bozeman, MT

Oral Presentations

Undergrad Virtual Poster: P-IE

Exhibit Hall 1 & 2 (America's Center)

VP38 Diversity of bees (Hymenoptera: Apoidea) during the flowering of coffee (*Coffea arabica* L.) with sustainable certification, in the "Santa Rosa" farm in Villa Rica, Pasco, period 2016–17. **Diego Aliaga-Barrena** (4200910761@scientifica.edu.pe), Candy Carrera and Alfonso Lizárraga, Univ. Científica del Sur, Lima, Peru

VP39 Native pollinator *Bombus impatiens* (Apidae) prefers non-native flower resources in isolated foraging preferences assays. **Anna Carney** (carneya10@mail.sacredheart.edu)¹, Victoria Jordan¹, Lexi Edwards¹ and Sarah Lawson², ¹Sacred Heart Univ., Fairfield, CT, ²Quinnipiac Univ., Hamden, CT

VP40 The abundance, biodiversity, and plant interactions of pollinators and pests at conservation habitats near agricultural fields in Nebraska. **Jaden Feeney** (jfeeney7279@gmail.com), Franklin Dubón García, Katharine Swoboda Bhattarai, Samantha Daniel and Julie Peterson, Univ. of Nebraska, North Platte, NE

VP41 Diurnal and nocturnal oviposition of *Bactericera cockerelli* (Hemiptera: Triozidae) on different tomato varieties. **Juan Mayo-Hernández** (juan_013189@hotmail.com)¹, Alberto Flores¹, Humberto Valenzuela², Jorge Luis Vega-Chavez³, Agustín Hernández-Juárez¹ and Nayely Cázares¹, ¹Univ. Autónoma Agraria Antonio Narro, Saltillo, CU, Mexico, ²Centro de Investigación en Química Aplicada, Saltillo, CU, Mexico, ³Instituto Tecnológico Superior de Huichapan, Huichapan, HG, Mexico

VP42 Vegans turned flesh-eaters: Altered macronutrient ratios promote cannibalistic behavior in a generalist herbivore (*Trichoplusia ni*). **Brendan Randall** (randa134@msu.edu)¹, Kayleigh Hauri¹, Elizabeth Cinto-Mejia¹, Grace Avalos² and William Wetzel¹, ¹Michigan State Univ., East Lansing, MI, ²Towson Univ., Towson, MD

VP43 Determining western bean cutworm, *Striacosta albicosta* (Lepidoptera: Noctuidae), optimal nutritional intake via choice studies. **Matheus Sacilotto** (mgsacilotto@gmail.com)¹, Katharine Swoboda Bhattarai², Carrie Deans³, Spence Behmer⁴ and Julie Peterson², ¹Univ. Estadual Paulista, Botucatu, Brazil, ²Univ. of Nebraska, North Platte, NE, ³Univ. of Minnesota, Minneapolis, MN, ⁴Texas A&M Univ., College Station, TX

VP44 Simulating larval movement of *Striacosta albicosta* in blended refuges by laboratory feeding on non-Bt, Cry1F and Vip3A maize. **Andrea Rilaković** (a.rilakovic@gmail.com)¹, Matheus Sacilotto², Katharine Swoboda Bhattarai¹, Débora Montezano³, Thomas Hunt⁴ and Julie Peterson¹, ¹Univ. of Nebraska, North Platte, NE, ²Univ. Estadual Paulista, Botucatu, Brazil, ³Univ. of Nebraska, Lincoln, NE, ⁴Univ. of Nebraska, Concord, NE

VP45 Feeding behavior of Coccinellidae on western bean cutworm egg masses. **Zaim Ugljic** (zaim_ugljic@hotmail.com)¹, Katharine Swoboda Bhattarai¹, Western Archibald² and Julie Peterson¹, ¹Univ. of Nebraska, North Platte, NE, ²Univ. of Nebraska, Lincoln, NE

VP46 Beneficial insects found in weeds surrounding sugarcane plantations in Costa Rica. **Angela Soto-Saenz** (angela.maría.ss@gmail.com)¹, Robin Gómez-Gómez², Julio Arias-Reverón¹ and Eduardo Cadet-Piedra³, ¹Univ. de Costa Rica, San José, Costa Rica, ²Univ. de Costa Rica, Alajuela, Costa Rica, ³Liga Agrícola Industrial de la Caña de Azúcar, Alajuela, Costa Rica

MONDAY, NOVEMBER 18, 2019 • MORNING

Program Workshop: Start Advocating Entomology on Social Media!

Room 261 (America's Center)

Moderators and Organizers: Ryan Gott, Phipps Conservatory and Botanical Gardens, Pittsburgh, PA; Karly Regan, Cornell University, Geneva, NY; Isa Betancourt, The Academy of Natural Sciences of Drexel University, Philadelphia, PA; Esther Ngumbi, University of Illinois, Champaign, IL; Jody Green, University of Nebraska, Lincoln, NE; Alex Wild, University of Texas, Austin, TX

8:00 – 9:50 AM and 10:00 – 11:50 AM

Workshop: Work on Your Social Life: Starting Social Science Collaborations

Room 225/226 (America's Center)

Moderators and Organizers: Hannah Penn¹, Katelyn Kesheimer², Scott O'Neal³, Monique Rivera⁴, Jerrod Penn¹, Erika Machtinger⁵ and Keith Machtinger⁶, ¹Louisiana State Univ., Baton Rouge, LA, ²Auburn Univ., Auburn, AL, ³Univ. of Nebraska, Lincoln, NE, ⁴Univ. of California, Riverside, CA, ⁵Pennsylvania State Univ., University Park, PA

8:00 AM - 11:00 AM

Student 3-min: All Sections 1

Room 132 (America's Center)

Moderators: Rayda K. Krell¹ and Patricia Prasifka², ¹Western Connecticut State Univ., Danbury, CT, ²Corteva Agriscience, West Fargo, ND

Due to the rapid speed of delivery, specific times are not listed for individual talks in this section. Each talk will be limited to a total of 3 minutes; talks will be given in sequential order as listed below starting at 8:00 AM with no pauses for withdrawn or no-show presenters.

8:00 AM - 9:10 AM

0621 Disentangling the effects of mass mortality events on soil food webs and arthropods. **Abby Jones** (aj1107@msstate.edu)¹, Marcus Lashley², Stephen Webb³ and Brandon Barton¹, ¹Mississippi State Univ., Mississippi State, MS, ²Univ. of Florida, Gainesville, FL, ³Noble Research Institute, Ardmore, OK

0622 The genomic analysis and phenology of *Haplaxius crudus* (Hemiptera: Cixiidae) in palm agroecosystems. **Lidia Komondy** (lkomondy@ufl.edu)¹, Ericka Helmick¹, Marina Ascunce², Erica Goss² and Brian Bahder¹, ¹Univ. of Florida, Davie, FL, ²Univ. of Florida, Gainesville, FL

0623 Effects of prairie restoration on beetles in Alabama's Black Belt Prairie. **Thomas Franzem** (tfranzem@crimson.ua.edu), Univ. of Alabama, Tuscaloosa, AL

0624 The contribution of electric transmission rights-of-way to pollinator biodiversity on the Cumberland Plateau. **Brady Dunaway** (bsd115@msstate.edu), Mississippi State Univ., Mississippi State, MS

0625 Faunistic studies of Scarabaeidae (phytophagous and dung beetles) of Mansehra District, Pakistan. **Sultan Zaib** (sultanzaib72@gmail.com), Government Degree College Nathiagali, Abbottabad, Pakistan

Oral Presentations

0626 How can life adapt to global warming and pollution? The answer may lie in the thermal springs of Yellowstone National Park. **Kelly Willemsens** (kelly_willemsens@hotmail.com)¹, Leon G. Higley¹ and Robert K. D. Peterson², ¹Univ. of Nebraska, Lincoln, NE, ²Montana State Univ., Bozeman, MT

0627 Presentation withdrawn

0628 Impact of injury and heat shock on the life history traits of *Cochliomyia macellaria* (F) (Diptera: Calliphoridae) and its implications in forensic entomology. **Jeffrey Yung** (jeffreyy@tamu.edu) and Aaron Tarone, Texas A&M Univ., College Station, TX

0629 Presentation withdrawn

0630 Landscape genetic structure of *Frankliniella fusca* in the southern US. **John Mahas** (jwm0055@auburn.edu) and Alana Jacobson, Auburn Univ., Auburn, AL

0631 Lipidomics reveals how the endoparasitoid wasp *Pteromalus puparum* manipulates host energy stores for its young. **Jiale Wang** (jialewang@zju.edu.cn)¹, Todd Schlenke² and Gongyin Ye¹, ¹Zhejiang Univ., Hangzhou, China, ²Univ. of Arizona, Tucson, AZ

0632 Williams Syndrome-related gene contributions to *Drosophila* social behavior: Uncovering an evolutionarily conserved genetic toolkit underlying animal sociality. **Iris Chin** (irischin@wustl.edu), Cassandra Vernier and Yehuda Ben-Shahar, Washington Univ., St. Louis, MO

0633 Monarchs on the farm: How milkweed, insecticides, and potassium affect detoxification in the monarch butterfly. **Annie Krueger** (annie.krueger@huskers.unl.edu), Terence A. Spencer, Ana Vélez, Tom Weissling and Troy Anderson, Univ. of Nebraska, Lincoln, NE

0634 Biodiversity of vector mosquitoes at the US Meat Animal Research Center. **Justine LaViolette** (justinelav@huskers.unl.edu) and Troy Anderson, Univ. of Nebraska, Lincoln, NE

0635 Genetic and phenotypic assessment of the insecticide susceptibility of *Culex pipiens* and *Culex restuans* in Illinois. **Kylee Noel** (krg@illinois.edu), Univ. of Illinois, Champaign, IL

0636 Studies of vector competence for Zika virus in *Aedes aegypti* populations from Florida. **Xiaodi Wang** (xiaodiwang@ufl.edu), Univ. of Florida, Vero Beach, FL

0637 Presence of bluetongue antibodies in east Texas goats and an investigation of the *Culicoides* vector. **Phillip Shults** (ptshults@tamu.edu)¹, Alphina Ho², Estelle Martin¹, Bethany McGregor³ and Edward Vargo¹, ¹Texas A&M Univ., College Station, TX, ²Prairie View A&M Univ., Prairie View, TX, ³Univ. of Florida, Vero Beach, FL

0638 Ecology and evolution of Hawaiian beach flies (Diptera: Canacidae). **Nina Pak** (nina.pak@berkeley.edu), Univ. of California, Berkeley, CA

0639 Diel host-seeking activity of *Culicoides sonorensis* biting midges at a southern California dairy. **Xinmi Zhang** (xzhan218@ucr.edu) and Alec Gerry, Univ. of California, Riverside, CA

0640 Increasing tick surveillance in Illinois through collaboration between, governmental, academic, and citizen scientists. **Lee Ann Lyons** (leelyons@illinois.edu)¹, Chris Stone², Nohra Mateus-Pinilla² and Rebecca Smith¹, ¹Univ. of Illinois, Champaign, IL, ²Illinois Natural History Survey, Champaign, IL

0641 Prevalence of *Babesia microti* and *Babesia odocoilei*, and their co-infection rates with *Borrelia burgdorferi* in *Ixodes scapularis* nymphs in Wisconsin. **Tela Zembsch** (zembsch@wisc.edu), Xia Lee, Gebbienna Bron, Lyric Bartholomay and Susan Paskewitz, Univ. of Wisconsin, Madison, WI

Grad 10-min: MUVE, Disease Transmission

Room 120 (America's Center)

Moderators: Shirley Luckhart¹ and Michael Reiskind², ¹Univ. of Idaho, Moscow, ID, ²North Carolina State Univ., Raleigh, NC

8:00 **0642** Assessment of entomological risk for Lyme borreliosis along a north-to-south gradient from southern Virginia into North Carolina. **Jimmie Teague** (jiteague@uncg.edu)¹, Reuben Garshong¹, Alexis M. Barbarin², Carl Williams² and Gideon Wasserberg¹, ¹Univ. of North Carolina, Greensboro, NC, ²North Carolina Division of Public Health, Raleigh, NC

8:10 **0643** The effects of timber harvest on *Ixodes scapularis* abundance and Lyme disease transmission. **Stephanie Hurd** (stephanie.hurd@maine.edu)¹, Laura Kenefic², Jessica Leahy¹, Andrew Richley², Carly Sponarski¹ and Allison Gardner¹, ¹Univ. of Maine, Orono, ME, ²USDA - Forest Service, Bradley, ME

8:20 **0644** Seasonal shifts of Florida wild mesomammal ectoparasites. **Sarah Mays Maestas** (sarah.maestas@ufl.edu), Samantha Wisely and Phillip E. Kaufman, Univ. of Florida, Gainesville, FL

8:30 **0645** Larval exposure to abscisic acid alters adult female *Anopheles stephensi* life history traits. **Dean Taylor** (tayl3660@vandals.uidaho.edu), Reagan Haney and Shirley Luckhart, Univ. of Idaho, Moscow, ID

8:40 **0646** A tale of two cities: Mosquito microbiomes and pathogen transmission in Rwanda's urban and rural environments. **Amanda Tokash-Peters** (amanda.peters001@umb.edu)¹, Mireille Kayirangwa², Simon Muhayimana², Jean Damascene Niyonzima², Ivan Tokash¹ and Douglas Woodhams¹, ¹Univ. of Massachusetts, Boston, MA, ²Univ. of Rwanda, Butare, Rwanda

8:50 **0647** Vertical transmission of Zika virus in a population of south Texas *Aedes aegypti*. **Jeremy Marshall** (jeremy_marshall01@utrgv.edu)¹, John Thomas¹ and Christopher Vitek², ¹Univ. of Texas, Edinburg, TX, ²Univ. of Texas Rio Grande Valley, Edinburg, TX

9:00 **0648** Additional blood-feeding reveals differences in oocyst survival and growth between *Plasmodium* species in *Anopheles gambiae*. **Hyeogsun Kwon**¹, **Rebekah Reynolds** (rebekahr@iastate.edu)¹, Maria Simões², George Dimopoulos² and Ryan Smith¹, ¹Iowa State Univ., Ames, IA, ²Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

9:10 **0649** The consequence of avian malarial infection on *Culex quinquefasciatus* survivorship. **Dayvion Adams** (ajadams968@tamu.edu), Andrew Golnar and Gabriel Hamer, Texas A&M Univ., College Station, TX

9:20 **0650** Small but mitey: Evaluation of sarcoptic mange caused by *Sarcoptes scabiei* in the American black bear (*Ursus americanus*) population in Pennsylvania. **Hannah Tiffin** (hsg14@psu.edu), Pennsylvania State Univ., University Park, PA

Grad 10-min: MUVE, Ecology and Behavior 1

Room 121 (America's Center)

Moderators: Grason Brown¹ and Edward Vargo², ¹Vector Control Unit of Puerto Rico, San Juan, PR, ²Texas A&M Univ., College Station, TX

8:00 **0651** The capacity of urban greenspace soils to support biological control. **Emily Sypolt** (trejosypolt.1@osu.edu)¹, Larry Phelan² and Mary Gardiner¹, ¹The Ohio State Univ., Columbus, OH, ²The Ohio State Univ., Wooster, OH

Oral Presentations

8:10 **0652** The role of antennae in the orientation responses of the common bed bug (*Cimex lectularius*) to host-associated cues. **Raymond Berry III** (rayberrytx@gmail.com) and Alvaro Romero, New Mexico State Univ., Las Cruces, NM

8:20 **0653** The importance of the tergal gland in *Blattella germanica* males and the effect of nutritional stress on mating success. **Samantha McPherson** (smmcphes2@ncsu.edu), Ayako Katsumata, Eduardo Hatano, Jules Silverman and Coby Schal, North Carolina State Univ., Raleigh, NC

8:30 **0654** Investigating the repulsive effects of fly maggots on invasive ant species. **Fabian List** (fabian.list@tamu.edu), Aaron Tarone and Edward Vargo, Texas A&M Univ., College Station, TX

8:40 **0655** Raising the “anty” in decomposition ecology: Effects of vertebrate carrion on fire ant colony performance. **Constance Lin** (clin75@tamu.edu), Micky Eubanks and Aaron Tarone, Texas A&M Univ., College Station, TX

8:50 **0656** Assessment of host age preference by the pupal parasitoid *Spalangia cameroni* (Hymenoptera: Pteromalidae). **Samuel Curtis** (webbcurtis@csus.edu) and Jimmy Pitzer, California State Univ., Sacramento, CA

9:00 **0657** Insecticide resistance development in the filth fly pupal parasitoid, *Spalangia cameroni* (Hymenoptera: Pteromalidae), using laboratory selections. **Vincent Maiquez** (vm935@csus.edu)¹, Jimmy Pitzer¹ and Christopher Geden², ¹California State Univ., Sacramento, CA, ²USDA - ARS, Gainesville, FL

9:10 **0658** Comparison of the effects of *Beauveria bassiana* on targeted *Musca domestica* and their parasitoids. **Alexandra Pagac** (aap363@psu.edu), Pennsylvania State Univ., University Park, PA

9:20 **0659** Impact of larval competition on life-history traits of the black soldier fly, *Hermetia illucens* (L.) (Diptera: Stratiomyidae), including mating success: Does size matter? **Brittny Jones** (moonbri_88@tamu.edu) and Jeffery K. Tomberlin, Texas A&M Univ., College Station, TX

Grad 10-min: MUVE, Insecticide Efficacy and Resistance 1

Room 122 (America's Center)

Moderators: Changlu Wang¹ and Alec Gerry², ¹Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, ²Univ. of California, Riverside, CA

8:00 **0660** Monitoring and controlling bed bugs in an office setting. **Shannon Sked** (shannon.sked@rutgers.edu)¹, Changlu Wang¹, Michael Levy² and Kathryn Hacker², ¹Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, ²Univ. of Pennsylvania, Philadelphia, PA

8:10 **0661** Effect of moisture on efficacy of selected insecticide dusts against the common bed bug, *Cimex lectularius*. **Sabita Ranabhat** (sabita.ranabhat12@gmail.com) and Changlu Wang, Rutgers, The State Univ. of New Jersey, New Brunswick, NJ

8:20 **0662** Efficacy of plant essential oils and deltamethrin against field-collected bed bugs (Hemiptera: Cimicidae). **Sudip Gaire** (sgaire@purdue.edu) and Ameya Gondhalekar, Purdue Univ., West Lafayette, IN

8:30 **0663** Evaluation of newly formulated gel baits against German cockroaches, *Blatella germanica* L. (Blattodea: Blattellidae), under laboratory conditions. **Anil Chandra Neupane** (anilnp111@gmail.com) and Lekhnath Kafle, National Pingtung Univ. of Science and Technology, Pingtung, Taiwan

8:40 **0664** Effects of ingesting the insect growth regulator novaluron on German cockroach (*Blattella germanica*) survivorship, feeding behavior, and reproduction. **Jamora Hamilton** (jahamil2@ncsu.edu), Ayako Wada-Katsumata and Coby Schal, North Carolina State Univ., Raleigh, NC

8:50 **0665** Toxicity profiles of aromatic and aliphatic essential oil components against strains of German cockroach. **Seun Oladipupo** (seun_oladipupo@yahoo.com), Arthur G. Appel and Xing P. Hu, Auburn Univ., Auburn, AL

9:00 **0666** Insecticide profiles of field collected German cockroaches from Taiwan. **I-Hsuan Hu** (i9856@hotmail.com)¹, Chow-Yang Lee² and Kok-Boon Neoh¹, ¹National Chung Hsing Univ., Taichung, Taiwan, ²Univ. of California, Riverside, CA

9:10 **0667** The relationship between insecticide resistance and the gut microbiome of *Blattella germanica*. **Zachery Wolfe** (wolfez@purdue.edu) and Michael Scharf, Purdue Univ., West Lafayette, IN

9:20 **0668** Fipronil resistance in the German cockroach: Some things never change. **Maria González-Morales** (magonz23@ncsu.edu), Coby Schal, Zachary DeVries, Madhavi Kakumanu and Angela Sierras, North Carolina State Univ., Raleigh, NC

9:30 **0669** Autosomal linkage analysis and inheritance of behavioral resistance to imidacloprid in house flies. **Caleb Hubbard** (chubb001@ucr.edu) and Alec Gerry, Univ. of California, Riverside, CA

Grad 10-min: MUVE, Life History

Room 123 (America's Center)

Moderators: Nathan Burkett-Cadena¹ and Megan Meuti², ¹Univ. of Florida, Vero Beach, FL, ²The Ohio State Univ., Columbus, OH

8:00 **0670** The changing phenology of residential *Rhipicephalus sanguineus* infestations. **Yuxun Tian** (yuxun.tian@ufl.edu)^{1,2}, Cynthia Lord¹ and Phillip Kaufman², ¹Univ. of Florida, Vero Beach, FL, ²Univ. of Florida, Gainesville, FL

8:10 **0671** Impacts of Artificial Light at Night (ALAN) on seasonal responses in *Culex pipiens*. **Lydia Fyie** (fyie.1@osu.edu), Mary Gardiner and Megan Meuti, The Ohio State Univ., Columbus, OH

8:20 **0672** Influence of soldier overloading on colony fitness in the eastern subterranean termite, *Reticulitermes flavipes*. **Austin Merchant** (ajme232@g.uky.edu), Univ. of Kentucky, Lexington, KY

8:30 **0673** Seasonality and spatial distribution of *Reticulitermes* spp. (Blattodea: Rhinotermitidae). **Mark Janowiecki** (janowiecki@tamu.edu) and Edward Vargo, Texas A&M Univ., College Station, TX

8:40 **0674** Relative contributions of host and symbiont to heterosis in *Coptotermes* hybrids (Isoptera: Rhinotermitidae). **Johnalyn Gordon** (johnalynmgordon@ufl.edu)¹, Gillian Gile², Nan-Yao Su¹ and Thomas Chouenc¹, ¹Univ. of Florida, Davie, FL, ²Arizona State Univ., Tempe, AZ

8:50 **0675** The effects of climate on *Ixodes scapularis* overwintering survival in Maine. **Michelle Volk** (michelle.volk@maine.edu), Univ. of Maine, Orono, ME

9:00 **0676** Asymmetry in “snapping” mandibles of termite soldiers provides mechanical advantage to ballistic strikes. **Aaron Mullins** (amull81@ufl.edu)¹, Paul Bardunias² and Nan-Yao Su¹, ¹Univ. of Florida, Davie, FL, ²State Univ. of New York, Syracuse, NY

Oral Presentations

9:10 **0677** Use of Gaussian mixture models with digital and morphological measurements for instar determination of the Asian cockroach (Blattodea: Blattellidae). **Madison Peterson** (mkp0044@auburn.edu), Arthur G. Appel and Xing Ping Hu, Auburn Univ., Auburn, AL

9:20 **0678** A reproductives excluder for subterranean termites using caste-wise head height differences. **Sang-Bin Lee** (lsb5162@ufl.edu), Thomas Chouenc and Nan-Yao Su, Univ. of Florida, Davie, FL

9:30 **0679** A motion sensor activated trap to study interactions of *Culicoides* and their vertebrate hosts. **Kristin Sloyer** (ksloyer@ufl.edu) and Nathan Burkett-Cadena, Univ. of Florida, Vero Beach, FL

9:40 **0680** Comparing the efficacy of passive trapping versus active collection methods in forensic entomology: Do the little things matter? **James Willett** (jrw023@shsu.edu) and Sibyl Bucheli, Sam Houston State Univ., Huntsville, TX

9:50 **0681** Comparing the consumption and reproductive potential of cat fleas fed on various bloods using an artificial feeding system. **Brittney Blakely** (brittnyb@nmsu.edu) and Alvaro Romero, New Mexico State Univ., Las Cruces, NM

Grad 10-min: PBT, Biology

Room 275 (America's Center)

Moderator: Richard Mankin, USDA - ARS, Gainesville, FL

8:00 **0682** Process of gregarization and solitarization of the Central American locust (*Schistocerca piceifrons*) in the lab and in the field. **Bert Foquet** (bertfoquet@tamu.edu)¹, Drew Little¹, Mario Poot Pech^{2,3} and Hojun Song¹, ¹Texas A&M Univ., College Station, TX, ²Conkal Technological Institute, Conkal, Mexico, ³CESVY-SENASICA, Merida, YC, Mexico

8:10 **0683** A few low-cost attempts at producing mole cricket mating calls. **Barukh Rohde** (barukh94-school@yahoo.com)¹, Daniel Bertak¹, Anthony Dermody¹, Nicole Benda¹, Adam Dale¹ and Richard Mankin², ¹Univ. of Florida, Gainesville, FL, ²USDA - ARS, Gainesville, FL

8:20 **0684** Metatranscriptome analysis reveals the importance of host-symbiont interactions for nutrient-provisioning role in the brown marmorated stink bug. **Priyanka Mittapelly** (mittapelly.1@buckeyemail.osu.edu)¹, Swapna Priya Rajarapu², Larry Phelan¹ and Andrew Michel¹, ¹The Ohio State Univ., Wooster, OH, ²North Carolina State Univ., Raleigh, NC

8:30 **0685** Compounds identified from fungal odors attract *Sirex noctilio* females. **Hajar Faal** (hajar faal@gmail.com)¹, Dong Cha² and Stephen Teale¹, ¹State Univ. of New York, Syracuse, NY, ²USDA - ARS, Hilo, HI

8:40 **0686** The antipredatory role of sequestered lichen metabolites in the lichen-feeding tiger moths (Erebidae: Arctiinae: Lithosiini). **Makani Fisher** (makanifisher@comcast.net)¹, Stephen Cameron¹ and Jennifer M. Zaspel^{1,2}, ¹Purdue Univ., West Lafayette, IN, ²Milwaukee Public Museum, Milwaukee, WI

8:50 **0687** The influence of causes of death on corpse management in *Reticulitermes flavipes*. **Jizhe Shi** (jizhe.shi@uky.edu) and Xuguo Zhou, Univ. of Kentucky, Lexington, KY

9:00 **0688** Bioconversion performance and life table of black soldier fly (*Hermetia illucens*) on fermented maize straw. **Zhenghui Gao** (zhgao1217@163.com), Fen Zhu, Xiao-Ping Wang and Wen Liu, Huazhong Agricultural Univ., Wuhan, China

9:10 **0689** Benefits of 'swine manure - maggot - livestock' production chain and risk assessment of heavy metals. **Wan-Qiang Wang** (wqwang518@126.com), Fen Zhu, Wen Liu and Xiao-Ping Wang, Huazhong Agricultural Univ., Wuhan, China

9:20 **0690** Host preference of parasitoids imported for control of *Acanthococcus lagerstroemiae* Kuwana on *Lagerstroemia indica* L. **Kenneth Masloski** (kemasloski@tamu.edu), John Grunseich, Anjel Helms and Kevin Heinz, Texas A&M Univ., College Station, TX

9:30 **0691** Potential of the ectoparasitoid *Habrobracon hebetor*, Say 1857 (Hymenoptera: Braconidae) for biological control of thirteen species of Lepidoptera pests. **Lucas Cantori** (cantori.lucas@usp.br) and José Roberto Parra, Univ. de São Paulo, Piracicaba, Brazil

9:40 **0692** Difference in development of internal reproductive organs, feeding and nutrient storage of *Harmonia axyridis* under diapause and reproductive inducing photoperiod. **Qiao Gao** (qiaogao1004@163.com), Bing-Xin Wei, Wen Liu, Jia-Lu Wang, Xing-Miao Zhou and Xiao-Ping Wang, Huazhong Agricultural Univ., Wuhan, China

9:50 **0693** Effects of overwintering length and temperature on pea leaf weevil (Coleoptera: Curculionidae) survival and oviposition. **Asha Wijerathna** (wijerath@ualberta.ca)¹, Héctor Cárcamo² and Maya Evenden¹, ¹Univ. of Alberta, Edmonton, AB, Canada, ²Agriculture and Agri-Food Canada, Lethbridge, AB, Canada

Grad 10-min: PBT, Molecular and Cellular Biology 1

Room 266 (America's Center)

Moderators: Blair Siegfried¹ and Nicholas Teets², ¹Univ. of Florida, Gainesville, FL, ²Univ. of Kentucky, Lexington, KY

8:00 **0694** Efficacy of transgenic conditional lethality under environmental stress in *Drosophila melanogaster*. **Fernan Perez-Galvez** (frpe222@uky.edu), Univ. of Kentucky, Lexington, KY

8:10 **0695** Transcriptomic analysis and functional characterization of bursicon homodimer-regulated genes in *Drosophila melanogaster*. **Jingjing Li** (jli@mail.missouri.edu), Univ. of Missouri, Columbia, MO

8:20 **0696** Beyond decapitation – exploring transcriptomes of the decapitating fire ant fly and its fire ant host. **Joan King** (joanie_king@tamu.edu), Edward Vargo and Robert Puckett, Texas A&M Univ., College Station, TX

8:30 **0697** Uncovering the expression profile of periostial hemocytes in the mosquito *Anopheles gambiae*. **Yan Yan** (yan.yan@vanderbilt.edu), Leah T. Sigle, David C. Rinker, Tania Y. Estevez-Lao, John A. Capra and Julian F. Hillyer, Vanderbilt Univ., Nashville, TN

8:40 **0698** Transcriptional regulation of reproductive diapause in the convergent lady beetle. **Emily Nadeau** (eana226@g.uky.edu), John Obrycki and Nicholas Teets, Univ. of Kentucky, Lexington, KY

8:50 **0699** Primary metabolism co-opted for defensive chemical production in the carabid beetle, *Harpalus pensylvanicus*. **Adam Rork** (amr483@psu.edu)¹, Sihang Xu², Athula Attygalle² and Tanya Renner¹, ¹Pennsylvania State Univ., University Park, PA, ²Stevens Institute of Technology, Hoboken, NJ

9:00 **0700** Presentation withdrawn

Oral Presentations

8:10 **0724** Creating education programs to address agribusiness professional's perception of pesticide effects on non-target species and the environment. **Matt Hamblin** (mhamblin@ksu.edu)¹, Sarah Zukoff², Kun Yan Zhu¹ and Brian Spiesman¹, ¹Kansas State Univ., Manhattan, KS, ²Kansas State Univ., Garden City, KS

8:20 **0725** Susceptibility of natural enemies to insecticides in greenhouses. **Rachel Bienemann** (bienemann.1@buckeyemail.osu.edu)¹, Carlos Esquivel¹, Nuris Acosta¹, Christopher Ranger² and Luis Canas¹, ¹The Ohio State Univ., Wooster, OH, ²USDA - ARS, Wooster, OH

8:30 **0726** Susceptibility of the swede midge parasitoid *Synopeas myles* (Hymenoptera: Platygastriidae) to foliar applied insecticides. **Carol McLennan** (cmclen01@uoguelph.ca), Angela Gradish and Rebecca Hallett, Univ. of Guelph, Guelph, ON, Canada

8:40 **0727** Does *Hippodamia convergens* (Coleoptera: Coccinellidae) life history benefit from omnivory compared to a monotypic diet of suitable prey? **Hannah Stowe** (hstowe@ksu.edu)¹, J. P. Michaud¹ and Tania N. Kim², ¹Kansas State Univ., Hays, KS, ²Kansas State Univ., Manhattan, KS

8:50 **0728** Diverse landscapes increase marketable yields of four crops in the Mid-Atlantic. **Christopher McCullough** (ctmccull@vt.edu)¹, Gina Angelella² and Megan O'Rourke¹, ¹Virginia Polytechnic Institute and State Univ., Blacksburg, VA, ²Virginia Polytechnic Institute and State Univ., Painter, VA

9:00 **0729** Impact of insecticide regime can negate the positive influence of native vegetation on natural enemy abundance in adjacent crop fields. **Sunita Pandey** (pandey.sunita2009@gmail.com)^{1,2} and Geoff Gurr^{1,2,3}, ¹Charles Sturt Univ., Orange, NSW, Australia, ²Graham Centre for Agricultural Innovation, Wagga Wagga, Australia, ³Fujian Agriculture and Forestry Univ., Fuzhou, China

9:10 **0730** Predators – the hunt begins: Benefits of IPM in commercial watermelon production. **Iván Grijalva** (igrijalv@purdue.edu), Amanda Skidmore, Rick Foster and Steve Yaninek, Purdue Univ., West Lafayette, IN

9:20 **0731** Flowers vs. Colorado potato beetle: Using perennial wildflower plantings to enhance conservation biological control. **Eric Middleton** (middl145@umn.edu)¹ and Ian MacRae², ¹Univ. of Minnesota, Minneapolis, MN, ²Univ. of Minnesota, Crookston, MN

9:30 **0732** Calendar-based pest management tactics in field crops have seasonal impacts on the abundance of epigaeic predators and their activity. **Lindsay Fennell** (lff39@cornell.edu)¹, John Tooker² and Kyle Wickings¹, ¹Cornell Univ., Geneva, NY, ²Pennsylvania State Univ., University Park, PA

9:40 **0733** Drainage ditches as sources of beneficial spiders on farms to enhance conservation biological control. **Dylan Kutz** (dkutz@umd.edu), Alina Avanesyan and William Lamp, Univ. of Maryland, College Park, MD

9:50 **0734** Community structure of spiders within corn agroecosystems under varying agronomic practices. **Samantha Daniel** (sdaniel403@gmail.com)¹, Julie Peterson¹ and Robert Wright², ¹Univ. of Nebraska, North Platte, NE, ²Univ. of Nebraska, Lincoln, NE

Grad 10-min: P-IE, Biocontrol of Insects 2

Room 265 (America's Center)

Moderators: Tiziana Oppedisano¹ and J. P. Michaud², ¹Oregon State Univ., Hermiston, OR, ²Kansas State Univ., Hays, KS

8:00 **0735** Aphid parasitism: A sustainable biocontrol option against aphid pests of pecans in the southeastern US. **Eddie Slusher** (eslusher0@yahoo.com)¹, Angelita Acebes¹ and Ted Cottrell², ¹Univ. of Georgia, Tifton, GA, ²USDA - ARS, Byron, GA

8:10 **0736** Presentation withdrawn

8:20 **0737** Examining the parasitoid complex associated with larch casebearer, *Coleophora laricella*, on eastern larch, *Larix laricina*, in the Great Lakes region. **Spencer Stout** (stout103@umn.edu) and Brian Aukema, Univ. of Minnesota, St. Paul, MN

8:30 **0738** Testing for fecundity compensation in parasitized sugarcane aphids. **Crys Wright** (cwright02@tamu.edu), Keyan Zhu-Salzman and Raul F. Medina, Texas A&M Univ., College Station, TX

8:40 **0739** Parasitoid mass release for management of the sugarcane aphid, *Melanaphis sacchari*, in sweet sorghum. **Nathan Mercer** (nhmercer13@gmail.com)¹, Ric Bessin² and John Obrycki¹, ¹Univ. of Kentucky, Lexington, KY, ²Univ. of Kentucky, Princeton, KY

8:50 **0740** Species complex and population variation of natural enemies of sugarcane aphid across gradients of landscape composition and structure. **Blake Elkins** (bhe23@tamu.edu)¹, Micky Eubanks² and Michael Brewer¹, ¹Texas A&M AgriLife Research, Corpus Christi, TX, ²Texas A&M Univ., College Station, TX

9:10 **0741** Adaptation education modeling, teaching population modeling with an agent based model. **Kit Martin** (kitmartin@u.northwestern.edu), Northwestern Univ., Evanston, IL

9:20 **0742** Field population interactions between the imported cabbageworm and its parasitoids. **Ryan Paul** (rlpaul@rams.colostate.edu), Dhaval Vyas and Paul Ode, Colorado State Univ., Fort Collins, CO

9:30 **0743** Efficacy of *Trichogramma ostriniae* in Nebraska field corn and dry edible bean. **Jeffrey Cluever** (cluever.jeffrey@huskers.unl.edu)¹, Robert Wright², Julie Peterson³ and Jeffrey Bradshaw¹, ¹Univ. of Nebraska, Scottsbluff, NE, ²Univ. of Nebraska, Lincoln, NE, ³Univ. of Nebraska, North Platte, NE

9:40 **0744** Host plant and trap color effects on captures of *Trissolcus japonicus* (Ashmead) (Hymenoptera: Scelionidae). **Nicole Quinn** (quinni01@vt.edu)¹, Elijah Talamas², Tracy C. Leskey³ and Chris Bergh¹, ¹Virginia Polytechnic Institute and State Univ., Winchester, VA, ²Florida Dept. of Agriculture and Consumer Services, Gainesville, FL, ³USDA - ARS, Kearneysville, WV

9:50 **0745** Evaluating insectary plants in the field for *Trissolcus japonicus*. **Nicolas Avila** (nicolasavila1231@gmail.com) and Anne Nielsen, Rutgers, The State Univ. of New Jersey, Bridgeton, NJ

Grad 10-min: P-IE, Chemical Ecology

Room 241 (America's Center)

Moderators: Ram B. Shrestha¹ and Tolulope Morawo², ¹Iowa State Univ., Ames, IA, ²Auburn Univ., Auburn, AL

8:00 **0746** The interactive effect of floral volatiles and aggregation pheromones on striped cucumber beetle aggregation. **Christie Shee** (cshee@purdue.edu)¹, Hui Zhu², Zsofia Szendrei³ and Ian Kaplan¹, ¹Purdue Univ., West Lafayette, IN, ²Northeast Normal Univ., Changchun, China, ³Michigan State Univ., East Lansing, MI

8:10 **0747** Smells like home: Antennal responses of two disparate lepidopteran pests to cranberry plant volatile emissions. **Bonnie Ohler** (bjohler@wisc.edu) and Christelle Guédot, Univ. of Wisconsin, Madison, WI

Oral Presentations

8:20 **0748** Semiochemical improvements to pheromone lures for reliable detection and monitoring of *Anthophonus eugenii* in Ontario greenhouses. **Cassandra Russell** (rcassie@uoguelph.ca)¹, Brent Short², Bill Lingren³ and Rebecca Hallett¹, ¹Univ. of Guelph, Guelph, ON, Canada, ²Trécé Inc., Adair, OK, ³Trece, Inc., Adair, OK

8:30 **0749** Furanocoumarin detoxification in *Depressaria radiella* and *Depressaria depressana* (Lepidoptera: Depressariidae). **Charles-Antoine Dean** (cedean2@illinois.edu), Wen-Yen Wu and May Berenbaum, Univ. of Illinois, Champaign, IL

8:40 **0750** Non-linear effects of tea green leafhopper (*Empoasca onukii*) density on tea (*Camellia sinensis*) secondary metabolites and implications for tea quality. **Eric Scott** (eric.scott@tufts.edu)¹, Ji-Peng Wei², Nicole Kfoury¹, Joshua Morimoto¹, Amma Agyei¹, Michelle Mu³, Albert Robbat¹ and Colin M. Orians¹, ¹Tufts Univ., Medford, MA, ²Chinese Academy of Agriculture Sciences, Hangzhou, China, ³Northeastern Univ., Boston, MA

8:50 **0751** Fungus gnat (Diptera: Sciaridae) attraction towards gourmet mushroom volatiles to make themselves at home. **Grace Sward** (sward.6@buckeyemail.osu.edu)¹, Christopher Ranger², Valerie Anderson¹ and Luis Canas¹, ¹The Ohio State Univ., Wooster, OH, ²USDA - ARS, Wooster, OH

9:00 **0752** An inordinate fondness for alfalfa: Understanding and exploiting host selection in *Lygus hesperus*. **Matthew Hetherington** (mhetheringto@wisc.edu)¹ and Johanne Brunet², ¹Univ. of Wisconsin, Madison, WI, ²USDA - ARS, Madison, WI

9:10 **0753** Phylogenetic analysis of the mechanisms for altering green leaf volatile (GLV) emissions in herbivorous Lepidoptera. **Anne Jones** (acj152@psu.edu), Tristan Cofer, Irmgard Seidl-Adams and James Tumlinson, Pennsylvania State Univ., University Park, PA

9:20 **0754** Plant defense by eavesdropping on the communication of herbivores: Is it common or rare? **Julianne Golinski** (julianne.golinski2@gmail.com), Eric Yip and John Tooker, Pennsylvania State Univ., University Park, PA

9:30 **0755** Multitrophic effects of a parasitoid in a non-host caterpillar. **Ching-Wen Tan** (czt5069@psu.edu), Michelle Peiffer and Gary Felton, Pennsylvania State Univ., University Park, PA

9:40 **0756** Plant volatiles modulate immune responses of a generalist herbivore. **Enakshi Ghosh** (enakshi.ghosh1@gmail.com), National Centre for Biological Sciences, Bangalore, India

9:50 **0757** *Polistes* venom compound N-(3-methylbutyl) acetamide attracts males of several *Polistes* (*Fuscopolistes*) species. **Dane Elmquist** (elmq8072@vandals.uidaho.edu)¹, Peter Landolt², William Rodney Cooper³, Hal Reed⁴, Jillian Foutz³, Timothy Clepper⁵, Bryon Kacprzyk⁶, Donald Teig⁷ and Richard Zack², ¹Univ. of Idaho, Moscow, ID, ²Washington State Univ., Pullman, WA, ³USDA - ARS, Wapato, WA, ⁴Oral Roberts Univ., Tulsa, OK, ⁵US Air Force, Shaw Air Force Base, SC, ⁶US Air Force, Moody Air Force Base, GA, ⁷US Air Force, Eglin Air Force Base, FL

Grad 10-min: P-IE, Climate Change

Room 240 (America's Center)

Moderators: Elaine Backus¹ and Nicholas Larson², ¹USDA - ARS, Parlier, CA, ²USDA - ARS, Beltsville, MD

8:00 **0758** Long-term effects of temperature on vibrational courtship signaling in *Enchenopa binotata* treehoppers. **Anthony Macchiano** (anthony.macchiano@slu.edu) and Kasey Fowler-Finn, Saint Louis Univ., St. Louis, MO

8:10 **0759** Asymmetric response to climate change: Temperature differentially alters herbivore success and host plants' response to herbivory. **Sulav Paudel** (sup215@psu.edu), Po-An Lin, Edwin Rajotte and Gary Felton, Pennsylvania State Univ., University Park, PA

8:20 **0760** Ideal tree host shifts in response to increased temperature and rainfall for the fall webworm (*Hyphantria cunea*). **Amy Adams** (amyeadams17@gmail.com), Univ. of Oklahoma, Norman, OK

8:30 **0761** Experimental heat waves have negative effects on Colorado potato beetle (*Leptinotarsa decemlineata*) and potato (*Solanum tuberosum*). **Joshua Snook** (snookjo2@msu.edu), Zsofia Szendrei and William Wetzel, Michigan State Univ., East Lansing, MI

8:40 **0762** The effects of climate change on floral microbes and nectar reward of *Penstemon heterophyllus*. **Kaleigh Russell** (kruss002@ucr.edu) and Quinn McFrederick, Univ. of California, Riverside, CA

8:50 **0763** Climate change effect of Megachilidae bee species along an elevation gradient. **Lindsay McCabe** (lma243@nau.edu), Northern Arizona Univ., Flagstaff, AZ

9:00 **0764** Say yes to the host: Examining consequences of drought for aphid and parasitoid wasp interactions. **Jessica Kansman** (jtkp8b@missouri.edu), Mason Ward and Debbie Finke, Univ. of Missouri, Columbia, MO

9:10 **0765** Warming impacts non-consumptive predator-prey interactions. **Cori Speights** (cjs815@msstate.edu), Angus Catchot and Brandon Barton, Mississippi State Univ., Mississippi State, MS

Grad 10-min: P-IE, Ecology 1

Room 262 (America's Center)

Moderators: David Epstein¹ and Michael Bredeson², ¹USDA - ARS, Washington, DC, ²Ecdysis Foundation, Brookings, SD

8:00 **0766** Species interactions along a domestication gradient: Response of bees, leaf herbivores and predators to human-mediated selection. **Julie Davis** (jd982@cornell.edu) and Jennifer Thaler, Cornell Univ., Ithaca, NY

8:10 **0767** Temporal and spatial ecology of the wheat stem sawfly and its natural enemies within Nebraskan landscapes. **Bethany Thomas** (bethany.thomas@huskers.unl.edu)¹, Gary Hein¹ and Jeffrey Bradshaw², ¹Univ. of Nebraska, Lincoln, NE, ²Univ. of Nebraska, Scottsbluff, NE

8:20 **0768** Linking cotton fleahopper spring emergence to local environmental conditions. **Kristin Hamons** (kritelle@tamu.edu)¹, Charles Suh², Gregory Sword¹ and Thomas Chappell¹, ¹Texas A&M Univ., College Station, TX, ²USDA - ARS, College Station, TX

8:30 **0769** Influence of abiotic factors on onion maggot adult population dynamics and larval damage in commercial onion fields. **Erica Moretti** (em763@cornell.edu) and Brian Nault, Cornell Univ., Geneva, NY

8:40 **0770** Assessing spatiotemporal variability in drivers of mountain pine beetle infestation intensity. **Michael Howe** (howe3@wisc.edu)¹, Allan Carroll², Claudio Gratton¹ and Kenneth Raffa¹, ¹Univ. of Wisconsin, Madison, WI, ²The Univ. of British Columbia, Vancouver, BC, Canada

Oral Presentations

8:50 **0771** Seasonal spatial distribution and overwintering behavior of *Drosophila suzukii*. **Kyoo Park** (parkk@oregonstate.edu)¹, Vaughn Walton¹, Gabriella Boyer², Jeff Yeo¹ and Rachel Blood¹, ¹Oregon State Univ., Corvallis, OR, ²Oregon State Univ., Hood River, OR

9:00 **0772** Seasonal dynamics and spatial distribution pattern of stink bugs (Hemiptera: Pentatomidae) in Nebraska corn and soybean. **Blessing Ademokoya** (bademokoya@huskers.unl.edu)¹, Thomas Hunt² and Robert Wright¹, ¹Univ. of Nebraska, Lincoln, NE, ²Univ. of Nebraska, Concord, NE

9:10 **0773** Estimating the differences in critical thermal maximum and metabolic rate of *Helicoverpa punctigera* Wallengren (Lepidoptera; Noctuidae) across life stages. **Abukari Bawa** (abawa@myune.edu.au), Univ. of New England, Armidale, NSW, Australia

9:20 **0774** Transgenerational impacts of *Manduca sexta* herbivory and maternal plant inbreeding on reproductive output in horsenettle (*Solanum carolinense*). **Chad Nihranz** (ctn118@psu.edu) and Andrew Stephenson, Pennsylvania State Univ., University Park, PA

9:30 **0775** Population genetic structure and relationships of *Bemisia tabaci* JpL (Hemiptera: Aleyrodidae) on Jeju Island, Korea, by using microsatellite markers. **Yujeong Park** (bravohpark@snu.ac.kr), Hwa Yeun Nam and Joon-Ho Lee, Seoul National Univ., Seoul, South Korea

9:40 **0776** Ants, plants and *Entylia carinata* treehoppers. **William Shoenberger** (shoenberger@slu.edu), Saint Louis Univ., St. Louis, MO

9:50 **0777** Scales as beneficial insects? Tree pests sustain biological control in urban landscapes. **Caleb Wilson** (cjwilso4@ncsu.edu) and Steven Frank, North Carolina State Univ., Raleigh, NC

Grad 10-min: P-IE, Ecology 2

Room 263 (America's Center)

Moderators: Bridget O'Neill¹ and M. Deane Bowers², ¹Corteva Agriscience, Indianapolis, IN, ²Univ. of Colorado, Boulder, CO

8:00 **0778** Soil nutrients and aboveground herbivory alter belowground nitrogen fixation in alfalfa. **Morgan Thompson** (mthompson1@terpmail.umd.edu) and William Lamp, Univ. of Maryland, College Park, MD

8:10 **0779** Ants, plants and fungi: Active ant nests remain low in plant pathogenic fungi throughout the myrmecochore fruiting season. **Chloe Lash** (clash@vols.utk.edu) and Charles Kwit, Univ. of Tennessee, Knoxville, TN

8:20 **0780** How do maternally transmitted microbes and ecological variation affect the insect immune response in the specialist butterfly *Lycaeides melissa*? **Su'ad Yoon** (suady@nevada.unr.edu)¹, Joshua Harrison², Matthew L. Forister¹ and Angela Smilanich¹, ¹Univ. of Nevada, Reno, NV, ²Univ. of Wyoming, Laramie, WY

8:30 **0781** The influence of belowground symbionts on aboveground plant-insect interactions across time. **Hannah Locke** (hlocke09@gmail.com) and Kerri Crawford, Univ. of Houston, Houston, TX

8:40 **0782** Fair weather friends: Has plant domestication disrupted the mycorrhizae-plant-herbivore symbiosis? **Zoe Getman-Pickering** (zg94@cornell.edu) and Jennifer Thaler, Cornell Univ., Ithaca, NY

8:50 **0783** Effects of herbivore chemical defenses on milkweed rhizosphere and monarch butterfly microbiomes. **Thorsten Hansen** (hanse125@purdue.edu) and Laramy Enders, Purdue Univ., West Lafayette, IN

9:00 **0784** A tale of two (or more) formulas: Inconsistent trophic position estimates from stable isotope data. **Mackenzie Kjeldgaard** (mkjeldgaard@tamu.edu) and Micky Eubanks, Texas A&M Univ., College Station, TX

9:10 **0785** How complex: The relationship between habitat complexity and arthropod biomass in urban forest fragments. **J. Christina Mitchell** (jcmitch5@ncsu.edu)¹, Vincent D'Amico² and Steven Frank¹, ¹North Carolina State Univ., Raleigh, NC, ²USDA - Forest Service, Newark, DE

9:20 **0786** Understanding how landscape pattern and history shape the ant communities occupying urban greenspaces. **Alex Typrak** (typrak.3@buckeyemail.osu.edu), Kayla I. Perry, Joe Raczkowski, Christopher Riley and Mary Gardiner, The Ohio State Univ., Columbus, OH

9:30 **0787** Rich and abundant spider communities result from enhanced dietary niche breadth and reduced overlap in a post-industrial shrinking city. **Yvan Delgado de la Flor** (delgadodelaflor.1@osu.edu)¹, Christopher Riley¹, Rodney Richardson² and Mary Gardiner¹, ¹The Ohio State Univ., Columbus, OH, ²York Univ., Toronto, ON, Canada

9:40 **0788** Does tree species origin or landscape context explain patterns of herbivory in an inner-city urban forest? **Christopher Riley** (riley.595@osu.edu) and Mary Gardiner, The Ohio State Univ., Columbus, OH

9:50 **0789** Does urban landscape fragmentation and contamination impose similar constraints on native and exotic lady beetle communities? **Denisha Parker** (parker.1052@osu.edu) and Mary Gardiner, The Ohio State Univ., Columbus, OH

Grad 10-min: P-IE, Invasive Species

Room 280 (America's Center)

Moderators: Tariq Mustafa¹ and Lori Spears², ¹Univ. of Agriculture, Faisalabad, Pakistan, ²Utah State Univ., Logan, UT

8:00 **0790** Humidity as a barrier for *Bagrada hilaris* (Hemiptera: Pentatomidae) to establish in Florida. **Sage Thompson** (sagemthompson@ufl.edu), Cleveland Ivey, Amanda Hodges and Norman Leppla, Univ. of Florida, Gainesville, FL

8:10 **0791** Potential establishment of *Bagrada hilaris* in Florida based on temperature, humidity, and weed hosts. **Cleveland Ivey** (civey@ufl.edu), Amanda Hodges and Norman Leppla, Univ. of Florida, Gainesville, FL

8:20 **0792** Susceptibility of cold-hardy apple cultivars to the brown marmorated stink bug (*Halyomorpha halys*). **Hailey Shanovich** (shano004@umn.edu), Eric C. Burkness and Robert Koch, Univ. of Minnesota, St. Paul, MN

8:30 **0793** Brown marmorated stink bug and its natural enemies in Georgia. **Sarah Hobby** (shobby@uga.edu)¹, Ashfaq Sial², Michael Toews¹, G. David Buntin³, Brett Blaauw², Ted Cottrell⁴, Shimat Joseph³, Elijah Talamas⁵ and Glynn Tillman⁶, ¹Univ. of Georgia, Tifton, GA, ²Univ. of Georgia, Athens, GA, ³Univ. of Georgia, Griffin, GA, ⁴USDA - ARS, Byron, GA, ⁵Florida Dept. of Agriculture and Consumer Services, Gainesville, FL, ⁶USDA - ARS, Tifton, GA

Oral Presentations

8:40 **0794** Voltinism and parasitoids of brown marmorated stink bug in Utah. **Mark Cody Holthouse** (cody.holthouse@aggiemail.usu.edu), Zachary Schumm, Lori Spears and Diane G. Alston, Utah State Univ., Logan, UT

8:50 **0795** Suitability of the arid shrub-steppe flora for brown marmorated stink bug feeding and development. **James Hepler** (james.hepler@wsu.edu) and Elizabeth Beers, Washington State Univ., Wenatchee, WA

9:00 **0796** Deciphering the seasonal host-use patterns of *Halyomorpha halys* on select deciduous plants. **Whitney Hadden** (wthadden@vt.edu)¹, Tracy C. Leskey² and Chris Bergh¹, ¹Virginia Polytechnic Institute and State Univ., Winchester, VA, ²USDA - ARS, Kearneysville, WV

9:10 **0797** Identification of insects associated with palms and phytoplasma in Puerto Rico. **Paola Agosto** (paola.agosto@upr.edu)¹, Jose Verle Rodrigues¹ and Susan Halbert², ¹Univ. of Puerto Rico, San Juan, PR, ²Florida Dept. of Agriculture and Consumer Services, Gainesville, FL

9:20 **0798** Phenology of *Lycorma delicatula* (Hemiptera: Fulgoridae) in Virginia. **Andrew Dechaine** (dechaine@vt.edu), Thomas Kuhar and Douglas G. Pfeiffer, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

9:30 **0799** Life history investigations of non-target planthoppers (Hemiptera: Fulgoroidea) for spotted lanternfly (*Lycorma delicatula*) (Hemiptera: Fulgoridae) host suitability studies. **Tyler Hagerty** (hagertyt@udel.edu) and Charles Bartlett, Univ. of Delaware, Newark, DE

9:40 **0800** A crazed queen and the sated supercolony: Determining the calcium limitation, sodium stress, and decline of tawny crazy ants (*Nylanderia fulva*) in a coastal tallgrass prairie. **Ryan Rehart** (reihart1@udayton.edu) and Chelse Prather, Univ. of Dayton, Dayton, OH

9:50 **0801** Examining farming and tending behavior of *Plagiolepis alluaudi* (Formicidae) towards *Paracoccus marginatus* (Pseudococcidae). **Matthew Miller** (matthew.miller@ufl.edu)¹, Brian Bahder¹, Andrea Lucky² and Thomas Chouvenc¹, ¹Univ. of Florida, Davie, FL, ²Univ. of Florida, Gainesville, FL

8:30 **0805** Evaluating the role of insecticidal seed treatments and refuge for managing soybean aphid virulence. **Carlos Esquivel** (esquivelpalma.1@buckeyemail.osu.edu), Luis Canas and Andrew Michel, The Ohio State Univ., Wooster, OH

8:40 **0806** Optimizing profit for farmers managing soybean aphid. **Ashley Dean** (adean@iastate.edu), Jarad Niemi, John Tyndall, Erin Hodgson and Matthew O'Neal, Iowa State Univ., Ames, IA

8:50 **0807** The impacts of mulching winter crops in urban settings on Aphidiidae populations. **Daniel Weisshaar** (danweisshaar@gmail.com)¹, Anna K. Wallingford² and Matthew Richardson¹, ¹Univ. of the District of Columbia, Washington, DC, ²Univ. of New Hampshire, Durham, NH

9:00 **0808** Triticale as a potential trap crop for wheat stem sawfly. **Erika Peirce** (epeirce@rams.colostate.edu), Darren Cockrell, Frank Peairs and Paul Ode, Colorado State Univ., Fort Collins, CO

9:10 **0809** Repairing rootworm refuges - Are neonicotinoid seed treatments playing a role in rootworm resistance to Bt? **Kyle Bekelja** (kbekelja@vt.edu)¹, Thomas Kuhar¹, Christian Krupke² and Sally Taylor³, ¹Virginia Polytechnic Institute and State Univ., Blacksburg, VA, ²Purdue Univ., West Lafayette, IN, ³Virginia Polytechnic Institute and State Univ., Suffolk, VA

9:20 **0810** Evaluation of neonicotinoids as inducers of systemic resistance against lepidopteran pests in soybeans, *Glycine max* (L.). **Scott Lee** (slee168@lsu.edu)¹, Arthur Richter², Jeff Murray² and Jeffrey Davis¹, ¹Louisiana State Univ., Baton Rouge, LA, ²Louisiana State Univ. AgCenter, Baton Rouge, LA

9:30 **0811** Interspecific competition of corn rootworm (*Diabrotica* spp.) under field conditions. **Edwin Benkert III** (benke017@umn.edu) and Kenneth Ostlie, Univ. of Minnesota, St. Paul, MN

9:40 **0812** Evaluating the use of a soil-applied insecticide as a pyramid with Bt corn for western corn rootworm management. **John McCulloch** (johnmcc@iastate.edu) and Aaron J. Gassmann, Iowa State Univ., Ames, IA

Grad 10-min: P-IE, IPM Field Crops 3

Room 231 (America's Center)

Moderators: Muhammad Haseeb¹ and Gabriela Inveninato Carmona², ¹Florida A&M Univ., Tallahassee, FL, ²Univ. of Nebraska, Lincoln, NE

8:00 **0813** Be B.o.L.D., make the first step count: Barcoding the COI gene for the alfalfa weevil (Coleoptera: Curculionidae) across multiple states. **Kyle Harrington** (kg'harrington@email.arizona.edu)¹, Wendy Moore² and Ayman Mostafa¹, ¹Univ. of Arizona, Phoenix, AZ, ²Univ. of Arizona, Tucson, AZ

8:10 **0814** Population dynamics and management of the pepper weevil, *Anthonomus eugenii* Cano (Coleoptera: Curculionidae), using biorational insecticides and aggregation pheromone. **Victoria Adeleye** (vadeleye@ufl.edu)¹, Dakshina Seal¹, Oscar Liburd² and Heather Mcaslane², ¹Univ. of Florida, Homestead, FL, ²Univ. of Florida, Gainesville, FL

8:20 **0815** Assessing the feasibility of using remote sensing for precision agriculture in insecticidal seed treated rice. **Megan Mulcahy** (mmulca2@lsu.edu), Blake Wilson and Thomas Reagan, Louisiana State Univ., Baton Rouge, LA

Grad 10-min: P-IE, IPM Field Crops 1

Room 230 (America's Center)

Moderators: Paul Borth¹ and Kaushalya Amarasekare², ¹Ento-Centric Consulting, Zionsville, IN, ²Tennessee State Univ., Nashville, TN

8:00 **0802** Attraction of the brown marmorated stink bug to olfactory cues emitted at different phenological stages of sunflowers. **Warren Wong** (whw1@sfsu.ca)¹, Paul Abram², Regine Gries¹ and Gerhard Gries¹, ¹Simon Fraser Univ., Burnaby, BC, Canada, ²Agriculture and Agri-Food Canada, Agassiz, BC, Canada

8:10 **0803** To study the response of various generic plant extracts to control the jassid (*Amrasca* spp.) and whitefly (*Bemisia* spp.) populations on sunflower (*Helianthus annuus*) crop. **Muhammad Ali** (ali.klasra@gmail.com)¹, Muhammad Ashfaq¹ and Asim Gulzar², ¹Univ. of the Punjab, Lahore, Pakistan, ²Pir Mehr Ali Shah Arid Agriculture Univ., Rawalpindi, Pakistan

8:20 **0804** Conventional and OMRI-approved insecticides for sustainable management of Caribbean fruit flies, *Anastrepha suspensa* Loew (Diptera: Tephritidae), in guava orchards in South Florida. **Simon Yeboah** (syeboah678@ufl.edu)¹, Nancy D. Epsky², Daniel Carrillo³, Norman Leppla¹ and Oscar Liburd¹, ¹Univ. of Florida, Gainesville, FL, ²USDA - ARS, Miami, FL, ³Univ. of Florida, Homestead, FL

Oral Presentations

8:30 **0816** A dynamic threshold approach for management of tarnished plant bug (*Lygus lineolaris*) in the Mississippi Delta. **Ryan Mann** (rtm143@msstate.edu)¹, Wilks Wood², Angus Catchot³, Whitney Crow³, Jeff Gore⁴ and Don Cook⁴, ¹Mississippi State Univ., Starkville, MS, ²Mississippi State Univ., Cleveland, MS, ³Mississippi State Univ., Mississippi State, MS, ⁴Mississippi State Univ., Stoneville, MS

8:40 **0817** Emergence and falling models of first instar of *Metcalfa pruinosa* (Hemiptera: Flatidae). **Min-Jung Kim** (2017-24294@snu.ac.kr), Sunghoon Baek and Joon-Ho Lee, Seoul National Univ., Seoul, South Korea

8:50 **0818** Identification and management of damaging woodboring beetles in blueberry. **Krystal Ashman** (krystalash93@gmail.com) and Oscar Liburd, Univ. of Florida, Gainesville, FL

9:00 **0819** Assessing distribution and critical density of *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae) in Florida strawberry and blueberry. **Babu Panthi** (panthibabu@ufl.edu)¹, Justin Renkema², Oscar Liburd³ and Sriyanka Lahiri¹, ¹Univ. of Florida, Wimauma, FL, ²Agriculture and Agri-Food Canada, Vineland, ON, Canada, ³Univ. of Florida, Gainesville, FL

9:10 **0820** Effects of biorational insecticides on gall midges of blueberries and their key parasitoids. **Marice Lopez** (mlopez90@ufl.edu) and Oscar Liburd, Univ. of Florida, Gainesville, FL

9:20 **0821** Is Hook® an effective attract-and-kill product for spotted-wing drosophila (*Drosophila suzukii* Matsumura) control in blueberries? **Gabrielle LaTora** (ag.latora@ufl.edu), Elena Rhodes and Oscar Liburd, Univ. of Florida, Gainesville, FL

9:30 **0822** Development of decision-making thresholds for tobacco thrips management in peanut. **Pin-Chu Lai** (pclai@uga.edu)¹, Mark R. Abney² and Rajagopalbabu Srinivasan¹, ¹Univ. of Georgia, Griffin, GA, ²Univ. of Georgia, Tifton, GA

Grad 10-min: P-IE, IPM Field Crops 5

Room 232 (America's Center)

Moderators: Anamika Sharma¹ and Julien Beuzelin², ¹Montana State Univ., Conrad, MT, ²Univ. of Florida, Belle Glade, FL

8:00 **0823** Potential insect deterrence in tri-species cotton hybrid. **Raven Allison** (ravennallison@tamu.edu)¹, David Kerns¹, Charles Suh², Steve Hague¹ and Alois Bell², ¹Texas A&M Univ., College Station, TX, ²USDA - ARS, College Station, TX

8:10 **0824** Developing a predictive risk model for peanut burrower bug, *Pangaeus bilineatus*, in Southeast US peanut systems. **Benjamin Aigner** (ben.aigner@uga.edu), Mark R. Abney and Jason Schmidt, Univ. of Georgia, Tifton, GA

8:20 **0825** A bee-line away from foliar insecticides for the Japanese beetle (Coleoptera: Scarabaeidae). **Kelsey Benthal** (kjbhnd@mail.missouri.edu)¹, Kevin Rice¹, James Hagler² and Scott Machtley², ¹Univ. of Missouri, Columbia, MO, ²USDA - ARS, Maricopa, AZ

8:30 **0826** Testing biological and chemical applications for clover root curculio (*Sitona hispidulus* F.) suppression in Intermountain West alfalfa. **Kaitlin Rim** (krim19@aggiemail.usu.edu)¹, Rachael Long² and Ricardo Ramirez¹, ¹Utah State Univ., Logan, UT, ²Univ. of California Cooperative Extension, Woodland, CA

8:40 **0827** Evaluating current thresholds for defoliating caterpillar pest in Mississippi peanut. **Brittany Lipsey** (lse37@msstate.edu)¹, Jeff Gore², Angus Catchot¹, Don Cook², Jason Bond² and Jason Sarver¹, ¹Mississippi State Univ., Mississippi State, MS, ²Mississippi State Univ., Stoneville, MS

8:50 **0828** Effects of farm management methods on slug abundance and injury in Virginia field crops. **Kirsten Brichler** (kbrichle@vt.edu)¹ and Sally Taylor², ¹Virginia Polytechnic Institute and State Univ., Blacksburg, VA, ²Virginia Polytechnic Institute and State Univ., Suffolk, VA

9:00 **0829** Developing alternative control systems for flea beetles in specialty crops. **Robert Brockman** (robert.brockman@uky.edu) and David Gonthier, Univ. of Kentucky, Lexington, KY

9:10 **0830** Characteristics of European earwig (*Forficula auricularia*) damage on citrus fruits. **Hanna Kahl** (hkahl@ucdavis.edu), Jay Rosenheim and Bodil Cass, Univ. of California, Davis, CA

9:20 **0831** Japanese beetle overwintering survival and phenology: Implications for developing a forecast. **Dominique Ebbenga** (ebbe0031@umn.edu), Eric C. Burkness and William D. Hutchison, Univ. of Minnesota, St. Paul, MN

9:30 **0832** Landrace and commercial varieties of dry beans, *Phaseolus vulgaris*: Preference by *Trialeurodes vaporariorum* and effect on parasitism by *Encarsia formosa*. **Renato Villegas-Luján** (renato_villegas1988@hotmail.com)¹, Martha España² and Sergio Sanchez- Peña¹, ¹Univ. Autónoma Agraria Antonio Narro, Saltillo, CU, Mexico, ²Univ. Autónoma de Zacatecas, Zacatecas, ZT, Mexico

Grad 10-min: P-IE, Pollination 1

Room 223 (America's Center)

Moderators: Kristen Brochu¹ and James Strange², ¹Pennsylvania State Univ., University Park, PA, ²USDA - ARS, Logan, UT

8:00 **0833** Impact of livestock and pasture on a stingless bee in the Andes. **Diana Obregon** (do265@cornell.edu)¹, Elena Stashenko² and Katja Poveda¹, ¹Cornell Univ., Ithaca, NY, ²Univ. Industrial de Santander, Bucaramanga, Colombia

8:10 **0834** Pollinators and plant nurseries: How ornamental plant management impacts solitary bee fitness. **Jacob Cecala** (jceca001@ucr.edu) and Erin Wilson Rankin, Univ. of California, Riverside, CA

8:20 **0835** How life in a contaminated landscape affects the fitness of the common eastern bumble bee, *Bombus impatiens*. **Sarah Scott** (scott.2094@osu.edu)¹, Frances S. Sivakoff² and Mary Gardiner¹, ¹The Ohio State Univ., Columbus, OH, ²The Ohio State Univ., Marion, OH

8:30 **0836** Effects of imidacloprid soil drench applications on nesting blue orchard mason bees (*Osmia lignaria*). **Christine Fortuin** (cfortuin@uga.edu), Univ. of Georgia, Athens, GA

8:40 **0837** Don't drink the guttation water! Investigating potential lethal effects of fungicide residue in turfgrass guttation fluid on *Bombus impatiens*. **Audrey Simard** (asimard@wisc.edu), Univ. of Wisconsin, Madison, WI

8:50 **0838** Effects of larval pesticide exposure on the adult solitary bee *Osmia lignaria*. **Clara Stuligross** (cstuligross@ucdavis.edu) and Neal Williams, Univ. of California, Davis, CA

9:00 **0839** Soil temperature modeling to predict emergence of the alkali bee. **Greta Dupuis** (greta.dupuis@wsu.edu) and Doug Walsh, Washington State Univ., Prosser, WA

9:10 **0840** Examination of blue orchard bee (*Osmia lignaria*) origin on dispersal in commercial cherry orchards. **Morgan Dunn** (morgan.dunn@aggiemail.usu.edu)¹, Theresa Pitts-Singer², Diane G. Alston¹ and Stephen Peterson³, ¹Utah State Univ., Logan, UT, ²USDA - ARS, Logan, UT, ³Foothills Bee Ranch, Visalia, CA

Oral Presentations

9:20 **0841** Presentation withdrawn

9:30 **0842** Pollination of kiwifruit (*Actinidia chinensis*) in Alabama. **Anthony Abbate** (abbata08@gmail.com), Geoffrey Williams and Joshua Campbell, Auburn Univ., Auburn, AL

Grad 10-min: P-IE, Pollination 2

Room 224 (America's Center)

Moderators: Tina Teague¹ and Michael Culy², ¹Arkansas State Univ., State Univ., AR, ²Corteva Agriscience, Indianapolis, IN

8:00 **0843** The addition or absence of nectar resources in a common milkweed (*Asclepias syriaca*) patch may influence where monarch butterflies (*Danaus plexippus*) lay eggs. **Nancy Shryock** (nshryock@iastate.edu)¹, John Pleasants¹ and Richard Hellmich², ¹Iowa State Univ., Ames, IA, ²USDA - ARS, Ames, IA

8:10 **0844** Building a better monarch waystation. **Adam Baker** (heresadamb@uky.edu) and Daniel Potter, Univ. of Kentucky, Lexington, KY

8:20 **0845** Monarch butterfly (*Danaus plexippus*) host plant selection and the effects of aphid competitors. **Katie LaPlante** (kmlaplante@mail.missouri.edu), Terryl L. Woods and Debbie Finke, Univ. of Missouri, Columbia, MO

8:30 **0846** Effects of increased nitrogen and plant species richness on milkweed quality and monarch fitness. **Rebecca Perry** (rlperry@ufl.edu)¹, Adam Dale¹ and Jaret Daniels², ¹Univ. of Florida, Gainesville, FL, ²Florida Museum of Natural History, Gainesville, FL

8:40 **0847** Diurnal and nocturnal contribution to pollination in Michigan urban gardens. **Nicole Wonderlin** (wonderl1@msu.edu) and Peter White, Michigan State Univ., East Lansing, MI

8:50 **0848** Local enhancement or local inhibition? A meta-analysis on bee foraging behavior. **Eva Horna Lowell** (evasofiah@gmail.com)¹, Mayra Vidal² and Shannon Murphy¹, ¹Univ. of Denver, Denver, CO, ²Syracuse Univ., Syracuse, NY

9:00 **0849** Which habitat types are important for bumble bees? **Michelle Boone** (boon0086@umn.edu)¹, Elaine Evans¹, Damon Leach² and Daniel Cariveau¹, ¹Univ. of Minnesota, St. Paul, MN, ²Univ. of Minnesota, Minneapolis, MN

9:10 **0850** Floral signals and pollen placement: How floral traits mediate indirect interactions between co-flowering Sierra wildflowers. **Devon Picklum** (dapicklum@gmail.com), Anne Leonardi and Lora Richards, Univ. of Nevada, Reno, NV

Grad 10-min: P-IE, Resistance Management

Room 242 (America's Center)

Moderators: Boris A. Castro¹ and Desmi Chandrasena², ¹Corteva Agriscience, Indianapolis, IN, ²Corteva Agriscience, Johnston, IA

8:00 **0852** Comparison of toxicological assays for quantifying insecticide resistance in sweetpotato whitefly (*Bemisia tabaci*). **Tanner Sparks** (tsparks@uga.edu) and David Riley, Univ of Georgia, Tifton, GA

8:10 **0853** Co-adaptation between CpGV and codling moth, *Cydia pomonella* L. **Jiangbin Fan** (fan.jiangbin@julius-kuehn.de)^{1,2}, Jörg Wennmann², Anne Nielson¹ and Johannes Jehle², ¹Rutgers, The State Univ. of New Jersey, Bridgeton, NJ, ²Julius Kühn-Institut, Darmstadt, Germany

8:20 **0854** Effects of larval or adult SmartStax PRO® dietary exposure on western corn rootworm (Coleoptera: Chrysomelidae) life history traits. **Jordan Reinders** (jordan.reinders3@gmail.com)¹, William Moar², Paula A. Price³, Sean Evans³, Graham P. Head³ and Lance Meinke¹, ¹Univ. of Nebraska, Lincoln, NE, ²Bayer Crop Science, Chesterfield, MO, ³Bayer Crop Science, St. Louis, MO

8:30 **0855** Microbial community response to Bt differs in Bt-resistant and susceptible western corn rootworm, *Diabrotica virgifera virgifera* LeConte. **Kyle Paddock** (paddockkk@missouri.edu)¹, Adriano Pereira¹, Aaron Ericsson¹, Debbie Finke¹, Kent S. Shelby² and Bruce Hibbard², ¹Univ. of Missouri, Columbia, MO, ²USDA - ARS, Columbia, MO

8:40 **0856** Investigating the state of insecticide resistance in Georgia populations of spotted wing drosophila (*Drosophila suzukii*). **Nathan Spaulding** (nathan.spaulding@uga.edu) and Ashfaq Sial, Univ. of Georgia, Athens, GA

8:50 **0857** Insecticide resistance in diamondback moth populations in Georgia and Florida. **John Bennett** (jeb04710@uga.edu)¹, David Riley¹ and Donald Champagne², ¹Univ. of Georgia, Tifton, GA, ²Univ. of Georgia, Athens, GA

9:00 **0858** Molecular basis of insecticide resistance in diamondback moth (*Plutella xylostella*) with emphasis on diamide insecticides. **Thomas Dunn** (tpd37618@uga.edu)¹, Donald Champagne¹ and David Riley², ¹Univ. of Georgia, Athens, GA, ²Univ. of Georgia, Tifton, GA

9:10 **0859** Microbially mediated resistance to pyrethroids in annual bluegrass weevil (*Listronotus maculicollis* Kirby). **Garrett Price** (gyp5046@psu.edu) and Benjamin McGraw, Pennsylvania State Univ., University Park, PA

9:20 **0860** Insecticide resistance monitoring and resistance mechanisms of an important insect pest in Southeastern cotton: The tarnished plant bug. **Seth Dorman** (sdjorman@vt.edu)¹, Aaron Gross² and Sally Taylor¹, ¹Virginia Polytechnic Institute and State Univ., Suffolk, VA, ²Virginia Polytechnic Institute and State Univ., Blacksburg, VA

Grad 10-min: P-IE, Vectors 1

Room 260 (America's Center)

Moderators: Katlyn Catron¹ and Loren Rivera Vega², ¹Virginia Polytechnic Institute and State Univ., Blacksburg, VA, ²Texas A&M Univ., College Station, TX

0861 Importance of weed for developing a sustainable management program against virus vectoring thrips.
Rafia Khan (rkhan@ufl.edu)¹, Dakshina Seal¹, Shouan Zhang¹, Oscar Liburd², Edward Evans¹ and Rajagopalbabu Srinivasan³, ¹Univ. of Florida, Homestead, FL, ²Univ. of Florida, Gainesville, FL, ³Univ. of Georgia, Tifton, GA

8:10 **0862** Effect of soybean vein necrosis virus on plant physiological growth, qualitative and quantitative yield parameters.
Asifa Hameed (akh5405@psu.edu), Cristina Rosa and Edwin Rajotte, Pennsylvania State Univ., University Park, PA

Oral Presentations

8:20 **0863** The effect of infected-plant removal on melon thrips abundance and Melon Yellow Spot Virus incidence in cucumber. **Yi-Ju Chen** (yiju1986@gmail.com)^{1,2}, Feng-Chyi Lin¹ and Ying-Huey Cheng¹, ¹Taiwan Agricultural Research Institute, Taichung City, Taiwan, ²Univ. of Georgia, Griffin, GA

8:30 **0864** Predation risk and conspecific alarm cues affect pea aphid vector competence for Pea Enation Mosaic Virus during complex multitrophic interactions. **Benjamin Lee** (benjamin.w.lee@wsu.edu), Saumik Basu and David Crowder, Washington State Univ., Pullman, WA

8:40 **0865** Effects of volatile organic compounds on aphid feeding behavior related to nonpersistent virus transmission. **John Dryburgh** (jdrybu1@lsu.edu) and Jeffrey Davis, Louisiana State Univ., Baton Rouge, LA

8:50 **0866** Factors affecting the distribution of Barley Yellow Dwarf Virus in Indiana cereal aphids. **Colleen Couch** (couch4@purdue.edu), Thorsten Hansen and Laramy Enders, Purdue Univ., West Lafayette, IN

9:00 **0867** A plant defense elicitor disrupts transmission-enhancing vector behavior. **Jaimie Kenney** (jkenn009@ucr.edu), Ian Wright, Marie-Eve Grandmont and Kerry Mauck, Univ. of California, Riverside, CA

9:10 **0868** Whitefly biotype dependent transmission of begomoviruses. **Saurabh Gautam** (sg37721@uga.edu)¹ and Rajagopalbabu Srinivasan², ¹Univ. of Georgia, Tifton, GA, ²Univ. of Georgia, Griffin, GA

9:20 **0869** Presentation withdrawn

Grad 10-min: SysEB, Behavior

Room 125 (America's Center)

Moderator: Ann Ray, Xavier Univ., Cincinnati, OH

8:00 **0870** The rules do not apply: Cooperative fighting in social insects. **Elizabeth Clifton** (elizabeth.marie.clifton@gmail.com) and Eldridge Adams, Univ. of Connecticut, Storrs, CT

8:10 **0871** Getting the best of both worlds: Fungus-farming termites achieve high strength and ventilation in their mounds. **Nikita Zachariah** (nikitaz@iisc.ac.in), Saurabh Singh, Tejas Murthy and Renee Borges, Indian Institute of Science, Bangalore, India

8:20 **0872** Zombie ant graveyards. **Natalie Imirzian** (nsi2@psu.edu) and David Hughes, Pennsylvania State Univ., University Park, PA

8:30 **0873** Cooperatively transporting massive prey up vertical surfaces in the weaver ant *Oecophylla smaragdina*. **Andrew Burchill** (andrew.burchill@asu.edu)¹, Kelly O'Meara¹, Theodore Pavlic¹, Stephen C. Pratt¹ and Chris Reid², ¹Arizona State Univ., Tempe, AZ, ²Univ. of Sydney, Sydney, NSW, Australia

8:40 **0874** To be(e) the hare or the tortoise: A comparison of cognitive traits in four honey bee species. **Catherine Tait** (catait@rams.colostate.edu) and Dhruba Naug, Colorado State Univ., Fort Collins, CO

8:50 **0875** Nocturnal foraging behavior of the giant honey bee, *Apis dorsata*. **Allison Young** (younga46@msu.edu)¹, Sangamesh Kodabalagi², Axel Brockmann³ and Fred Dyer¹, ¹Michigan State Univ., East Lansing, MI, ²Univ. of Agricultural Sciences, Bangalore, India, ³National Centre for Biological Sciences, Bangalore, India

9:00 **0876** Variation in worker behavior towards queen bees during colony introduction. **Lauren Rusert** (lrmrusert@ncsu.edu), Bradley Metz and David Tarpy, North Carolina State Univ., Raleigh, NC

9:10 **0877** Genetic ancestry and host preferences of *Culex pipiens* populations collected from above- and below-ground breeding sites. **Anna Noreuil** (anna.noreuil@gmail.com) and Megan Fritz, Univ. of Maryland, College Park, MD

9:20 **0878** Digging into the mechanics of burrowing in dragonfly larvae. **Emily Sandall** (els22@psu.edu), Jonah Ulmer, István Mikó and Margaret Byron, Pennsylvania State Univ., University Park, PA

9:30 **0879** Presentation withdrawn

9:40 **0880** Diversity of the gut bacterial microbiome of the green June beetle *Cotinis nitida*, (Coleoptera: Scarabaeidae). **Roy Kucuk** (rkucuk@g.clemson.edu), Clemson Univ., Clemson, SC

Grad 10-min: SysEB, Biogeography and Disturbance

Room 127 (America's Center)

Moderator: Nicole Gunter, Cleveland Museum of Natural History, Cleveland, OH

8:00 **0881** Presentation withdrawn

8:10 **0882** The influence of functional traits on habitat selection in alpine beetle communities. **Jillian Schat** (jschat@wisc.edu) and Sean Schoville, Univ. of Wisconsin, Madison, WI

8:20 **0883** Impact of climate and mountains on diversity of the Andean genus of ladybird beetles (Coleoptera: Coccinellidae). **Karen Salazar** (karen.salazar@mnhn.fr)¹, Guillaume Achaz^{1,2} and Romain Nattier¹, ¹Muséum national d'Histoire naturelle, Paris, France, ²Centre Interdisciplinaire de Recherche en Biologie, Paris, France

8:30 **0884** Nocturnal insects along an elevational gradient in Sierra de Baoruco: Species and community responses to altitude. **Stephanita BondocGawa Mafla-Mills** (stephanie.maflamills@rutgers.edu), Rutgers, The State Univ. of New Jersey, Newark, NJ

8:40 **0885** Up a "kreek" in South Pacific damselfly taxonomy: *Varuatuabasis* Ober and Staniczek (Odonata: Coenagrionidae). **Natalie Saxton** (natalie.a.saxton@byu.edu)¹, Milen Marinov², Abigail Dean¹, Colin Jensen¹, Daniel Ferguson¹, Carolyn 'Ita'aehau³ and Seth M. Bybee¹, ¹Brigham Young Univ., Provo, UT, ²Ministry for Primary Industries, Auckland, New Zealand, ³Brigham Young Univ., Laie, HI

8:50 **0886** Differential responses of grassland ground beetle (Coleoptera: Carabidae) communities to Conservation Reserve Program management practices. **Evan Waite** (waitesevan@gmail.com)¹, Mary Liz Jameson¹, Gregory Houseman¹, William Jensen², Molly Reichenborn¹, Fraser Watson¹, Alexandra Morphew¹ and Esben Kjaer¹, ¹Wichita State Univ., Wichita, KS, ²Emporia State Univ., Emporia, KS

9:00 **0887** Presentation withdrawn

9:10 **0888** Influence of the annual flood pulse and invasive vegetation (*Eichhornia crassipes*) on the ecology of aquatic Hemiptera and their associates in the Atchafalaya River floodplain. **Patricia Shorter** (pshort3@lsu.edu), William Kelso and Michael Kaller, Louisiana State Univ., Baton Rouge, LA

Oral Presentations

9:20 **0889** Tempest devastates the tea cup. Diversity declines after Hurricane Maria in *Heliconia* aquatic insect communities in Puerto Rico. **Jaclyn Everly** (jeverl1@ilstu.edu)¹ and Donald Yee², ¹Illinois State Univ., Bloomington, IL, ²The Univ. of Southern Mississippi, Hattiesburg, MS

9:30 **0890** Effects of restoration management techniques on dung beetle functional community in tallgrass prairie. **Sheryl Hosler** (sherylhosler@gmail.com)¹, Holly Jones² and Nicholas Barber³, ¹Univ. of Illinois, Chicago, IL, ²Northern Illinois Univ., DeKalb, IL, ³San Diego State Univ., San Diego, CA

Grad 10-min: SysEB, Evolution 1

Room 130 (America's Center)

Moderator: Jerome Weis, Milwaukee Public Museum, Milwaukee, WI

8:00 **0891** Exploring ancient hellscapes: Comparing morphology of Cretaceous haidomyrmecines and extant ants to predict early ant ecological niches. **Christine Sosiak** (ces43@njit.edu)¹ and Phillip Barden², ¹New Jersey Institute of Technology, Newark, NJ, ²American Museum of Natural History, New York, NY

8:10 **0892** Late Cretaceous domatia reveal the antiquity of plant-mite mutualisms. **S. Augusta MacCracken** (gussie@umd.edu)^{1,2}, Ian Miller³ and Conrad Labandeira¹, ¹Smithsonian Institution, National Museum of Natural History, Washington, DC, ²Univ. of Maryland, College Park, MD, ³Denver Museum of Nature and Science, Denver, CO

8:20 **0893** A comprehensive review of maternal age effects on offspring fitness in insects. **Claudia Hallagan** (claudia.hallagan@gmail.com), Robin Tinghitella and Shannon Murphy, Univ. of Denver, Denver, CO

8:30 **0894** Ant breeding systems and colony genetic diversity: The case of neotropical carpenter ants. **Marianne Azevedo-Silva** (azevedosilva.m@gmail.com)¹, Gustavo M. Mori², Carolina S. Carvalho³, Marina C. Côrtes⁴, Anete P. Souza¹ and Paulo S. Oliveira¹, ¹Univ. Estadual de Campinas, Campinas, Brazil, ²Univ. Estadual de São Paulo, São Vicente, Brazil, ³Instituto Tecnológico Vale, Belém, Brazil, ⁴Univ. Estadual de São Paulo, Rio Claro, Brazil

8:40 **0895** How sexual selection shapes important honey bee drone traits. **Garett Slater** (slater20@purdue.edu), Brock Harpur and Krispn Given, Purdue Univ., West Lafayette, IN

8:50 **0896** Effects of age and behavioral state on brain gene expression and regulation in an incipiently social bee. **Wyatt Shell** (was2000@wildcats.unh.edu)¹ and Sandra Rehan^{1,2}, ¹Univ. of New Hampshire, Durham, NH, ²York Univ., Toronto, ON, Canada

9:00 **0897** Evolutionary origins of social insect queen pheromones: Effects of condition-dependent indices of fecundity on the totipotent worker caste of a socially flexible bee. **Callum Kingwell** (callumkingwell@gmail.com)¹, Jocelyn G. Millar², Yasuharu Yoshimi³ and William Wcislo⁴, ¹Cornell Univ., Ithaca, NY, ²Univ. of California, Riverside, CA, ³Univ. of Fukui, Fukui, Japan, ⁴Smithsonian Tropical Research Institute, Panama City, Panama

9:10 **0898** The evolution of social behavior in the orchid bee, *Euglossa dilemma*. **Nicholas Saleh** (nsaleh@ucdavis.edu) and Santiago Ramírez, Univ. of California, Davis, CA

Grad 10-min: SysEB, Morphology and Phylogeny

Room 124 (America's Center)

Moderator: Luc Leblanc, Univ. of Idaho, Moscow, ID

8:00 **0899** Functional morphology and biomechanics of trap-jaw ants in the *Dacetin* genus group. **Josh Gibson** (jcgibso2@illinois.edu) and Andrew Suarez, Univ. of Illinois, Champaign, IL

8:10 **0900** Presentation withdrawn

8:20 **0901** Presentation withdrawn

8:30 **0902** Wing interference patterns documented in the four families of crane flies (Diptera: Tipuloidea). **Robert Conrow** (rtc58@drexel.edu) and Jon K. Gelhaus, Drexel Univ., Philadelphia, PA

8:40 **0903** Quantifying differences in phase polyphenism in *Schistocerca nitens*, *S. serialis cubense*, *S. americana*, and *S. piezifrons*. Bert Foquet, **Toan Hoang** (htoan169@tamu.edu) and Hojun Song, Texas A&M Univ., College Station, TX

8:50 **0904** Mandible morphology as a reflection of diet in basal termite lineages. **Megan M. Wilson** (meywilson@yahoo.com) and Jessica Ware, Rutgers, The State Univ. of New Jersey, Newark, NJ

9:00 **0905** Do nitidulids have eyes bigger than their bellies? Morphological variation tied to feeding behavior. **Gareth Powell** (garethpowell@byu.edu) and Seth M. Bybee, Brigham Young Univ., Provo, UT

9:10 **0906** Delineation of formerly undescribed, morphologically cryptic members of the *Pseudanophthalmus pubescens* species group (Coleoptera: Carabidae). **Jedidiah Nixon** (jedidiah.nixon883@topper.wku.edu) and T. Keith Philips, Western Kentucky Univ., Bowling Green, KY

9:20 **0907** The evolution and biogeography of Australian Dacini fruit flies (Diptera: Tephritidae). **Melissa Starkie** (melissa.starkie@hdr.qut.edu.au), Queensland Univ. of Technology, Brisbane, QLD, Australia

Grad 10-min: SysEB, Phylogenetics 2

Room 131 (America's Center)

Moderator: Susan J. Weller, Univ. of Nebraska, Lincoln, NE

8:00 **0908** Genetic diversity of flower midge *Dasineura* sp. from major Bt cotton growing districts of Karnataka, India. **Jeer Vinayaka** (jvinayaka05@gmail.com) and Nandihalli B. S., Univ. of Agricultural Sciences, Dharwad, India

8:10 **0909** Characterizing the genomic architecture of divergence along the speciation continuum in the *Rhagoletis pomonella* species complex. **Meredith Doellman** (mdoellma@nd.edu)¹, Thomas Powell², Stewart Berlocher³, Katherine Inskeep¹, Cheyenne Tait⁴, Peter Meyers¹, Glen Hood⁵, McCall Calvert⁶, Scott Egan⁷, Gregory Ragland⁶ and Jeffrey Feder¹, ¹Univ. of Notre Dame, South Bend, IN, ²Binghamton Univ., State Univ. of New York, Binghamton, NY, ³Univ. of Illinois, Champaign, IL, ⁴Univ. of Massachusetts, Amherst, MA, ⁵Wayne State Univ., Detroit, MI, ⁶Univ. of Colorado, Denver, CO, ⁷Rice Univ., Houston, TX

8:20 **0910** Toward a new estimate of phylogenetic relationships among leaf-mining flies (Diptera: Agromyzidae) from anchored hybrid enrichment. **Jing-Li Xuan** (jxuan@ncsu.edu)¹, Brian M. Wiegmann¹, Matthew L. Lewis², Brian Cassel¹ and Sonja J. Scheffer³, ¹North Carolina State Univ., Raleigh, NC, ²USDA - ARS, Beltsville, MD, ³USDA - APHIS, Beltsville, MD

Oral Presentations

8:30 **0911** Global domination by crazy ants: Phylogenomics reveals biogeographic history and invasive species relationships in the genus *Nylanderia* (Hymenoptera: Formicidae). **Jason Williams** (jwill81@ufl.edu)¹, Miles Zhang¹, Michael Lloyd², John S. LaPolla³, Ted Schultz² and Andrea Lucky¹, ¹Univ. of Florida, Gainesville, FL, ²Smithsonian Institution, Washington, DC, ³Towson Univ., Towson, MD

8:40 **0912** Total-evidence analysis of male Leptanillinae (Hymenoptera: Formicidae) clarifies phylogeny of male-based taxon *Phaulomyrma*. **Zachary Griebenow** (zgriebenow@ucdavis.edu)¹, Georg Fischer² and Evan Economo², ¹Univ. of California, Davis, CA, ²Okinawa Institute of Science and Technology, Okinawa, Japan

8:50 **0913** Phylogeny and biogeography of *Dorymyrmex*, a New World amphitropical disjunct. **Jill Oberski** (jtoferski@ucdavis.edu), Univ. of California, Davis, CA

9:00 **0914** Gene tree symmetry in the age of genomics—a case study on *Pseudapis* bees. **Silas Bossert** (sb2346@cornell.edu)^{1,2}, Elizabeth Murray¹, Alain Pauly³, Sean Brady⁴ and Bryan N. Danforth², ¹Smithsonian Institution, National Museum of Natural History, Washington, DC, ²Cornell Univ., Ithaca, NY, ³Royal Belgian Institute of Natural Sciences, Brussels, Belgium, ⁴Smithsonian Institution, Washington, DC

9:10 **0915** Ultraconserved elements reveal the phylogeny of the largest clade of cleptoparasitic bees (Apidae: Nomadinae). **Trevor Sless** (tjs328@cornell.edu)¹, Michael Branstetter², Jessica Gillung¹, Erin Krichalsky², Kerrigan Tobin², Jakub Straka³, Jerome Rozen⁴, Felipe Freitas⁵, Aline Martins⁶, Silas Bossert⁷ and Bryan N. Danforth¹, ¹Cornell Univ., Ithaca, NY, ²USDA - ARS, Logan, UT, ³Charles Univ., Prague, Czech Republic, ⁴American Museum of Natural History, New York, NY, ⁵Univ. de São Paulo, Ribeirão Preto, Brazil, ⁶Univ. Federal do Paraná, Brazil, ⁷Smithsonian Institution, National Museum of Natural History, Washington, DC

9:20 **0916** Host with the most: The effects of phytochemistry on parasitoid (Hymenoptera: Braconidae) niche breadth. **Ryan Ridenbaugh** (r.ridenbaugh@knights.ucf.edu)¹, Jordan Dowell¹, Megan Head², Barbara Sharanski¹ and Toni Withers³, ¹Univ. of Central Florida, Orlando, FL, ²Australian National Univ., Acton, ACT, Australia, ³Scion and Better Border Biosecurity Collaboration, Rotorua, New Zealand

9:30 **0917** The evolution and diversification of planidial larvae in Chalcidoidea (Hymenoptera). **Austin Baker** (bakerau73@gmail.com) and John M. Heraty, Univ. of California, Riverside, CA

9:40 **0918** Phylogenomics and evolution of the gall associated genera of the wasp subfamily Doryctinae (Hymenoptera: Braconidae) based on UCE data. **Ernesto Samaca** (ernestosamaca@gmail.com)¹, Bernardo Santos² and Alejandro Zaldívar³, ¹Univ. Nacional Autónoma de México, Ciudad de México, DF, Mexico, ²Smithsonian Institution, National Museum of Natural History, Washington, DC, ³Univ. Nacional Autónoma de México, Coyoacán, DF, Mexico

9:50 **0919** From fairy tales to phylogenies: Phylogenomic insights into the evolution of fairy wasps (Chalcidoidea: Mymaridae). **Krissy Dominguez** (cdomi009@ucr.edu) and John M. Heraty, Univ. of California, Riverside, CA

Undergrad 10-min: PBT and MUVE 1

Room 276 (America's Center)

Moderators: Umut Toprak¹ and Jonas King², ¹Ankara Univ., Ankara, Turkey, ²Mississippi State Univ., Mississippi State, MS

8:00 **0920** A CRISPR homing gene drive targeting a haplolethal gene with rescue averts resistance. **Emily Yang** (ey97@cornell.edu), Jackson Champer, JingXian Liu, Yoo Lim Lee, Chen Liu, Philipp Messer and Andrew Clark, Cornell Univ., Ithaca, NY

8:10 **0921** Functional analysis of the Store-Operated Calcium Entry (SOCE) in lipid metabolism of *Leptinotarsa decemlineata*. **Cansu Doğan** (7cansudogan@gmail.com)¹, Sabine Hänniger², David Heckel², Dwayne Hegedus³, Şerife Bayram¹ and Umut Toprak¹, ¹Ankara Univ., Ankara, Turkey, ²Max Planck Institute for Chemical Ecology, Jena, Germany, ³Agriculture and Agri-Food Canada, Saskatoon, SK, Canada

8:20 **0922** Presentation withdrawn

8:30 **0923** Examining the physiological basis of hybrid mortality in *Nasonia* parasitoid wasps. **Lucia Botnaru** (ls05114@georgiasouthern.edu), Bonnie Cobb and Joshua Gibson, Georgia Southern Univ., Statesboro, GA

8:40 **0924** Functional role of tick α -d-galactosidase in carbohydrate metabolism and red meat allergy. **Ahmed Mohamed** (ahmed.mohamed@usm.edu), Gary Crispell, Surendra Sharma, Faizan Tahir and Shahid Karim, The Univ. of Southern Mississippi, Hattiesburg, MS

8:50 **0925** An infection acquired early in adulthood impacts the ability of a mosquito to fight an infection acquired later in life. **Joseph Powers** (joseph.c.powers@vanderbilt.edu), Raymar Turangan, Bryan Jossie and Julian F. Hillyer, Vanderbilt Univ., Nashville, TN

9:00 **0926** Exploring the function of a *Cimex* protein arising from apparent trans-domain horizontal gene transfer. **Tony Zbyinski** (tjz19@msstate.edu), Chandler Vines, Aline Badial and Jonas King, Mississippi State Univ., Mississippi State, MS

9:10 **0927** The quantification of *Wolbachia* and the microbiome within the mosquito *Culex quinquefasciatus* across a temperature gradient. **Jaimy Jabon** (jaimy.jabon001@umb.edu)¹, Megan Fung¹, Amanda Tokash-Peters^{1,2}, Robert Stevenson¹, Mike Pollard¹ and Douglas Woodhams¹, ¹Univ. of Massachusetts, Boston, MA, ²Univ. of Rwanda, Butare, Rwanda

Undergrad 10-min: SysEB 1

Room 126 (America's Center)

Moderator: Paul Z. Goldstein, USDA - ARS, Washington, DC

8:00 **0928** Structural and functional characterization of antlion (Myrmeleontidae: Neuroptera) mouthparts and their feeding mechanism. **Jordan Minninger** (jminnin1@kent.edu)¹, Asheesh Lanba² and Matthew Lehnert¹, ¹Kent State Univ., North Canton, OH, ²L4iS, University Park, PA

8:10 **0929** Chemical and structural properties of proboscis of flower-visiting butterflies facilitate flower visitation. **Rena Fonseca** (rfonseca@kent.edu)¹, Daytona Hedrick¹, Jamie Shell¹, Jianing Wu² and Matthew Lehnert¹, ¹Kent State Univ., North Canton, OH, ²Sun Yat-Sen Univ., Guangzhou, China

Oral Presentations

8:20 **0930** Fluid rise by capillary action in the split proboscis of Lepidoptera and its implications to proboscis evolution. **Emily Francis** (efranci7@kent.edu)¹, Daytona Hedrick¹, Ashley Lash¹, Jianing Wu² and Matthew Lehnert¹, ¹Kent State Univ., North Canton, OH, ²Sun Yat-Sen Univ., Guangzhou, China

8:30 **0931** Ecological variation in ant eyes. **Chloe Jolley** (cmj8@njit.edu)¹ and Phillip Barden², ¹New Jersey Institute of Technology, Newark, NJ, ²American Museum of Natural History, New York, NY

8:40 **0932** Comparative morphology of Diptera pupae. **Even Dankowicz** (danko@brandeis.edu)¹ and Torsten Dikow², ¹Brandeis Univ., Waltham, MA, ²Smithsonian Institution, National Museum of Natural History, Washington, DC

8:50 **0933** Development of *Camponotus floridanus* exoskeleton in the absence of *Blochmannia*. **Dylan Valente** (dylan.valente@scranton.edu)¹, Veronica Sinotte², Robert Spalletta¹ and Marc Seid¹, ¹The Univ. of Scranton, Scranton, PA, ²Univ. of Copenhagen, Copenhagen, Denmark

9:00 **0934** Geometric morphometric analysis for Ichneumonidae and Evaniiidae (Hymenoptera: Apocrita) with new Mesozoic taxa from Myanmar and China. **Peter Shih** (petershih11@gmail.com)¹, Longfeng Li², Dmitry Kopylov³, Daqing Li² and Dong Ren⁴, ¹Academy for Allied Health Sciences, Scotch Plains, NJ, ²Gansu Agricultural Univ., Lanzhou, China, ³Russian Academy of Sciences, Moscow, Russian Federation, ⁴Capital Normal Univ., Beijing, China

9:10 **0935** Next-generation phylogenomics of Sepidiini (Tenebrionidae: Pimeliinae). **Kali Swichtenberg** (kls672@nau.edu)¹, Kojun Kanda¹, Marcin Kaminski² and Aaron Smith², ¹Northern Arizona Univ., Flagstaff, AZ, ²Purdue Univ., West Lafayette, IN

9:20 **0936** Are these parasitic wasps as old as we think? Phylogeny, divergence dating, and historical biogeography of Labeniae (Hymenoptera: Ichneumonidae). **Marissa Sandoval** (marmarsandoval@berkeley.edu)^{1,2}, Séan Brady² and Bernardo Santos², ¹Univ. of California, Berkeley, CA, ²Smithsonian Institution, National Museum of Natural History, Washington, DC

9:30 **0937** Taxonomic revision of the Afrotropical mydasfly genera *Eremohaplomydas* Bequaert, 1959 and *Lachnocorynus* Hesse, 1969 (Diptera: Mydidae). **Claire Boschart** (ckb3@rice.edu)¹ and Torsten Dikow², ¹Rice Univ., Houston, TX, ²Smithsonian Institution, National Museum of Natural History, Washington, DC

Antlion Pit Demonstration Day

Exhibit Hall 1 & 2 (America's Center) • 9:00 AM - 11:00 AM

Organizer: Marianne Alleyne, Univ. of Illinois, Champaign, IL



Meet the finalists of the Antlion Pit before the competition and get a glimpse of what will be presented at the finals. All finalists will exhibit their innovations in the Exhibit Hall and are looking forward to meeting you and hearing your feedback.

Student 3-min: All Sections 2

Room 132 (America's Center)

Moderators: Rayda K. Krell¹ and Patricia Prasifka², ¹Western Connecticut State Univ., Danbury, CT, ²Corteva Agriscience, West Fargo, ND

Due to the rapid speed of delivery, specific times are not listed for individual talks in this section. Each talk will be limited to a total of 3 minutes; talks will be given in sequential order as listed below starting at 9:30 AM with no pauses for withdrawn or no-show presenters.

9:30 AM - 10:40 AM

0938 Task repertoires of hygienic workers reveals a link between specialized necrophoric behaviors in honey bees. **Adrian Perez** (arez@ucdavis.edu) and Brian Johnson, Univ. of California, Davis, CA

0939 Presentation withdrawn

0940 Honey bee neurogenomic response to deformed wing virus. **Ian Traniello** (traniel2@illinois.edu) and Gene Robinson, Univ. of Illinois, Champaign, IL

0941 Sweet nectar: Differential floral use among butterflies of the northern Great Plains. **Adrienne Antonsen** (adrienne.antonsen@ndsu.edu) and Jason Harmon, North Dakota State Univ., Fargo, ND

0942 Neonicotinoid effects on plant-pollinator interactions in a field setting. **Benjamin Chiavini** (benjamin.chiavini@gmail.com), Nicholas Anderson and Alexandra Harmon-Threatt, Univ. of Illinois, Champaign, IL

0943 Diversity of *Lasioglossum* bees in adjacent prairie and temperate deciduous forest ecosystems in the Driftless Region of eastern Iowa. **Isabella Metcalf** (imetcalf@dbq.edu)¹, Adam Hoffman¹ and Stephen Hendrix², ¹Univ. of Dubuque, Dubuque, IA, ²Univ. of Iowa, Iowa City, IA

0944 Individual variation in task performance among honey bee nurses. **Mathew Pekora** (pekora82@students.rowan.edu)¹, Daniel Charbonneau², Olivia Smithson¹, Sonnie Sheahan¹, Tyrell Harris¹, Simona Loshi¹, Kimberly Ojeda-Celaya¹, Timothy A. Linksvayer³ and Svetlana Vojvodic¹, ¹Rowan Univ., Glassboro, NJ, ²Univ. of Arizona, Tucson, AZ, ³Univ. of Pennsylvania, Philadelphia, PA

0945 The effects of plant-associated fungi on cotton interactions with *Hippodamia convergens* (Guérin-Méneville). **Janaina Camara Siqueira da Cunha** (janaina.cunha@tamu.edu) and Gregory Sword, Texas A&M Univ., College Station, TX

0946 Susceptibility to Cry9Aa and Cry1Ba in *Spodoptera frugiperda* with field evolved-resistance to maize producing Cry1F. **Aria Deluna** (adeluna@vols.utk.edu), Rafael Santos and Juan-Luis Jurat-Fuentes, Univ. of Tennessee, Knoxville, TN

0947 Impact of crop phenology on the population of whitefly (*Bemisia tabaci* Gennadius) and cotton yield in Multan, Pakistan. **Muhammad Iqbal** (iqbal_906@hotmail.com)¹, Muhammad Jalal Arif¹, Mansoor Ul Hasan¹, Shafqat Saeed², Noor Abid Saeed³, Tariq Mustafa¹ and Faizan Amjad¹, ¹Univ. of Agriculture, Faisalabad, Pakistan, ²Univ. of Agriculture, Multan, Pakistan, ³Nuclear Institute for Agriculture and Biology, Faisalabad, Pakistan

Oral Presentations

0948 Tree species effect on the natural control of the head miner, *Heliocheilus albipunctella*, in a millet agroforestry system in Senegal. **Ibrahima Thiaw** (thiawmy@gmail.com)^{1,2,3}, Valérie Soté^{1,3}, François-Régis Goebel¹ and Mouhamadou Diakhate², ¹INRA - CIRAD, Montpellier, France, ²Univ. Gaston Berger, Saint-Louis, Senegal, ³Centre de Suivi Ecologique, Dakar, Senegal

0949 Presentation withdrawn

0950 Presentation withdrawn

0951 Elevated CO₂ alters the expression of exogenous transgene and toxins in transgenic Bt rice under different levels of nitrogen fertilizer. **Yanmin Liu** (2017202044@njau.edu.cn) and Fajun Chen, Nanjing Agricultural Univ., Nanjing, China

0952 Sonic weaponry and nutritional warfare against the rangeland pest *Melanoplus sanguinipes*. **Carter Wolff** (clw905@msstate.edu)¹, Derek Woller², Chris Reuter², Lonnie Black², Marcus Lashley³ and Brandon Barton¹, ¹Mississippi State Univ., Mississippi State, MS, ²USDA - APHIS, Phoenix, AZ, ³Univ. of Florida, Gainesville, FL

0953 Influences of bioenergy cropping system identity and management on microarthropod communities. **Allison Zahorec** (zahoreca@msu.edu), Lisa Tiemann and Douglas A. Landis, Michigan State Univ., East Lansing, MI

0954 Influence of the tawny crazy ant (*Nylanderia fulva*) in sugarcane arthropod ecology. **Forest Huval** (lavuh07@yahoo.com), Blake Wilson and Thomas Reagan, Louisiana State Univ., Baton Rouge, LA

0955 Ecological effects of lawn plant diversity: A synthesis of what we know and what we do not know. **Balwinder Kaur** (bkaur@ufl.edu), Basil Iannone and Adam Dale, Univ. of Florida, Gainesville, FL

0956 Advocate piracy: How rose flowers communicate with pirates to defend against thrips. **Marco Díaz** (marco.diaz@unimilitar.edu.co), Daniel Rodriguez and Luis Cubillos-Quijano, Univ. Militar Nueva Granada, Cajicá, Colombia

0957 Susceptibility of two invasive subterranean termite species (Blattodea: Rhinotermitidae) and their hybrids to noviflumuron baits. **Jayshree Patel** (jayshree.patel@ufl.edu), Thomas Chouvenc and Nan-Yao Su, Univ. of Florida, Davie, FL

0958 Aptness of the three microbial insecticides and a conventional pyrethroid for the control of *Tribolium castaneum* (Herbst) population from Punjab, Pakistan. **Faizan Amjad** (faizanzinda@gmail.com)¹, Qurban Ali², Shah Zaman¹, Muhammad Faisal³, Muhammad Sagheer¹, Mansoor ul Hasan¹ and Muhammad Iqbal¹, ¹Univ. of Agriculture, Faisalabad, Pakistan, ²Ayub Agricultural Research Institute, Faisalabad, Pakistan, ³Pest Warning and Quality Control of Pesticides, Lahore, Pakistan

0959 Status of alternative fumigants for controlling key stored product pests. **Jacqueline Maille** (jmaille@ksu.edu)¹, Gomaa Ramadan¹, M. Wes Schilling², Peter Edde³ and Thomas Phillips¹, ¹Kansas State Univ., Manhattan, KS, ²Mississippi State Univ., Mississippi State, MS, ³Altria Client Services, Inc, Richmond, VA

Grad 10-min: MUVE, Diversity

Room 120 (America's Center)

Moderators: Donald Yee¹ and Salehe Abbar², ¹The Univ. of Southern Mississippi, Hattiesburg, MS, ²Rutgers, The State Univ. of New Jersey, New Brunswick, NJ

10:10 **0960** Species richness and decomposition in pig carrion in northern California. **Alex Dedmon** (acdedmon@ucdavis.edu), Univ. of California, Davis, CA

10:20 **0961** Investigation of the seasonal variation of the larval stages of Diptera present during decomposition of human remains in Southeast Texas. **Bethany Walker** (bawalker@shsu.edu) and Sibyl Bucheli, Sam Houston State Univ., Huntsville, TX

10:30 **0962** Thermal tolerance of the larval stadia of two forensically important blow fly species, *Chrysomya rufifacies* (Macquart) and *Cochliomyia macellaria* (Fabricius) (Diptera: Calliphoridae). **Lauren Beebe** (laurenejbeebe@gmail.com), Travis Rusch and Aaron Tarone, Texas A&M Univ., College Station, TX

10:40 **0963** Effects of ecological stoichiometry on spatial distribution patterns and competition of *Aedes* species in New Orleans, Louisiana. **Catherine Dean** (catherine.dean@usm.edu)¹, J. Hunter Deerman², Kevin Kuehn¹ and Donald Yee¹, ¹The Univ. of Southern Mississippi, Hattiesburg, MS, ²Mississippi Dept. of Health, Jackson, MS

10:50 **0964** Using genetic diversity to differentiate mosquito populations. **Rachel Malampy** (rachel.malampy01@utrgv.edu)¹, Erin Schuenzel¹ and Christopher Vitek², ¹Univ. of Texas, Edinburg, TX, ²Univ. of Texas Rio Grande Valley, Edinburg, TX

11:00 **0965** Evaluation of the molecular oxidase cycrome marker I "DNA barcode codes" in mosquitoes of medical importance in the coastal areas of the Córdoba Department. **Richard Hoyos** (rhoyoslopez@gmail.com)¹ and Angie Toro², ¹Univ. del Sinú, Montería, Colombia, ²Univ. de Pamplona, Norte de Santander, Colombia

11:10 **0966** Presentation withdrawn

11:20 **0967** Assessing host-associated differentiation in *Dermacentor variabilis* (Acari: Ixodidae). **Mackenzie Tietjen** (kenzietietjen@tamu.edu)¹, Maria Esteve-Gasent¹, Ivan Castro-Arellano² and Raul F. Medina¹, ¹Texas A&M Univ., College Station, TX, ²Texas State Univ., San Marcos, TX

11:30 **0968** Genetic population of German cockroaches in urban. **Xueyang Fan** (xf24@njit.edu), New Jersey Institute of Technology, Newark, NJ

Grad 10-min: MUVE, Ecology and Behavior 2

Room 121 (America's Center)

Moderators: Chloé Lahondère¹ and Allison Gardner², ¹Virginia Polytechnic Institute and State Univ., Blacksburg, VA, ²Univ. of Maine, Orono, ME

10:10 **0969** Sugar feeding by invasive mosquitoes on ornamental plants. **Irving Upshur** (uforde96@vt.edu) and Chloé Lahondère, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

10:20 **0970** Comparison of blood and sugar feeding behavior of *Aedes albopictus* by host and flower availability. **Kara Fikrig** (kmf227@cornell.edu), Sharon Dang, Kimberly St Fleur, Henry Goldsmith, Sophia Qu, Hannah Rosenthal and Laura Harrington, Cornell Univ., Ithaca, NY

10:30 **0971** Presentation withdrawn

10:40 **0972** Mosquitoes and frogs: Discovering the factors underlying this unusual relationship. **Joanna Reinhold** (reinjm0@vt.edu) and Chloé Lahondère, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

10:50 **0973** Climate change and the dynamics of mosquito populations in Virginia. **Morgen VanderGiessen** (morgenvg@vt.edu), Irving Upshur, Clement Vinauger, Luis Escobar and Chloé Lahondère, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

Oral Presentations

11:40 **0997** Effects of gut symbionts on presoldier differentiation in the eastern subterranean termite, *Reticulitermes flavipes*. **Rajani Sapkota** (rsapkota@purdue.edu) and Michael Scharf, Purdue Univ., West Lafayette, IN

11:50 **0998** The gut microbial diversity of a Chagas disease vector varies across habitat type, region, and infection status in central Panama. **Kaylee Arnold** (kaylee.arnold@uga.edu)¹, Christina Varian¹, Troy Kieran¹, Azael Saldaña², Franklin Samudio², Jose Calzada² and Nicole Gottdenker¹, ¹Univ. of Georgia, Athens, GA, ²Gorgas Memorial Research Institute, Panama City, Panama

Grad 10-min: PBT, Insecticide Resistance

Room 275 (America's Center)

Moderators: Jeff Scott¹ and Fang Zhu², ¹Cornell Univ., Ithaca, NY, ²Pennsylvania State Univ., University Park, PA

10:10 **0999** Presentation withdrawn

10:20 **1000** Roles of multiple sodium channel mutations in pyrethroid resistance in *Aedes aegypti*. **Felipe Andreazza** (felipe92@msu.edu)^{1,2}, Wilson Valbon¹, Yoshiko Nomura¹, Yuzhe Du³, Mengli Chen⁴, Eugenio Oliveira² and Ke Dong¹, ¹Michigan State Univ., East Lansing, MI, ²Univ. Federal de Viçosa, Viçosa, Brazil, ³USDA - ARS, Stoneville, MS, ⁴Zhejiang Univ., Hangzhou, China

10:30 **1001** The *Drosophila* model system for analyzing natural variation in resistance to *Metarhizium* spp. **Jonathan Wang** (jonwang@umd.edu), Hsiao-Ling Lu and Raymond J. St. Leger, Univ. of Maryland, College Park, MD

10:40 **1002** Can diamide insecticides affect *Chloridea virescens* flight performance and refuge Bt crops area strategy? **Lucas Barros** (lucasbarros.lsb@gmail.com)¹, Paul Merten², Pedro Yamamoto¹ and Steven Naranjo², ¹Univ. de São Paulo, Piracicaba, Brazil, ²USDA - ARS, Maricopa, AZ

10:50 **1003** Multiple point mutations of ryanodine receptor confer diamide insecticides resistance in the rice stem borer, *Chilo suppressalis* (Walker). **Jingmei Huang** (huangjmswu@163.com), Shunfan Wu and Congfen Gao, Nanjing Agricultural Univ., Nanjing, China

11:00 **1004** Evolution of insect metallothioneins. **Mei Luo** (luomei@msu.edu)^{1,2}, Henry Chung² and Hong-yi Wei¹, ¹Jiangxi Agricultural Univ., Nanchang, China, ²Michigan State Univ., East Lansing, MI

11:10 **1005** Potential for insecticide resistance on Kenyan populations of *Tuta absoluta*. **Denis Nyamu** (nyamu.2@osu.edu)¹, Andrew Michel¹, Jesca Mbaka², George Norton³ and Luis Canas¹, ¹The Ohio State Univ., Wooster, OH, ²Kenya Agricultural & Livestock Research Organization, Thika, Kenya, ³Virginia Polytechnic Institute and State Univ., Blacksburg, VA

11:20 **1006** The gut microbiota of field-collected larvae of *Spodoptera frugiperda* (Lepidoptera: Noctuidae) harbors a rich community of insecticide-metabolizing bacteria. **Ana Flávia Freitas Gomes** (anaffgomes@usp.br) and Fernando Luis Cônsoli, Univ. de São Paulo, Piracicaba, Brazil

11:30 **1007** Monitoring the susceptibility of *Helicoverpa zea* (Lepidoptera: Noctuidae) populations collected in Texas to Cry1Ac, Cry2Ab2 and Vip3Aa using F₂ screens. **José Santiago González** (josec.santiago@tamu.edu), Fei Yang and David Kerns, Texas A&M Univ., College Station, TX

Grad 10-min: PBT, Molecular and Cellular Biology 2

Room 266 (America's Center)

Moderators: Kristopher Silver¹ and Ana Vélez², ¹Kansas State Univ., Manhattan, KS, ²Univ. of Nebraska, Lincoln, NE

10:10 **1008** Biosurveillance using raw sequence data analysis from mixed insect traps. **Travis van Warmerdam** (tcv34@mssstate.edu)¹, Austin Drury¹, Todd Gilligan² and Jonas King¹, ¹Mississippi State Univ., Mississippi State, MS, ²USDA - APHIS, Fort Collins, CO

10:20 **1009** Micro-CT scanning: A 3D approach to visualizing the structure of light organs in fireflies (Coleoptera: Lampyridae). **Kristin Dunn** (KristinDunn@ufl.edu)¹, Steve Davis², Seth M. Bybee³, Kathrin Stanger-Hall⁴ and Marc Branham¹, ¹Univ. of Florida, Gainesville, FL, ²American Museum of Natural History, New York, NY, ³Brigham Young Univ., Provo, UT, ⁴Univ. of Georgia, Athens, GA

10:30 **1010** A non-destructive, rabid and economic DNA extraction method from a single parasitoid wasp. **Jackie Billotte** (jacqueline.billotte@ucdenver.edu), Jonathan Shortt, Laura Timm and David Pollock, Univ. of Colorado, Aurora, CO

10:40 **1011** Presentation withdrawn

10:50 **1012** Identifying and characterizing phage genes that control arthropod reproduction. **Dylan Shropshire** (dylan.shropshire@vanderbilt.edu) and Seth Bordenstein, Vanderbilt Univ., Nashville, TN

11:00 **1013** Ecological risk assessment for RNA interference developed for emerald ash borer suppression. **Flavia Pampolini** (fpa233@g.uky.edu) and Lynne Rieske-Kinney, Univ. of Kentucky, Lexington, KY

11:10 **1014** Characterization of a serine protease inhibitor in the Colorado potato beetle. **Jonathan Hernandez** (alfred.hernandez@sbcglobal.net), Timothy Moural and Fang Zhu, Pennsylvania State Univ., University Park, PA

11:20 **1015** The role of scavenger receptors in double-stranded RNA uptake in the western corn rootworm. **Molly Darlington** (mndarlington@gmail.com) and Ana Vélez, Univ. of Nebraska, Lincoln, NE

11:30 **1016** Mechanisms affecting double-stranded RNA stability and strategies for enhancing stability in the European corn borer. **Anastasia Cooper** (anacooper@ksu.edu)¹, Zhitao Yu¹, Huifang Song^{1,2}, Kristopher Silver¹, Jianzhen Zhang^{1,2} and Kun Yan Zhu¹, ¹Kansas State Univ., Manhattan, KS, ²Shanxi Univ., Taiyuan, China

11:40 **1017** Advances in RNAi mediated control in the small hive beetle. **Steve Reyna** (smreyna@ncsu.edu) and Marcé Lorenzen, North Carolina State Univ., Raleigh, NC

Grad 10-min: PBT, Pollinator Biology and Ecology

Room 267 (America's Center)

Moderators: Matthew Heerman¹ and Tania N. Kim², ¹USDA - ARS, Beltsville, MD, ²Kansas State Univ., Manhattan, KS

10:10 **1018** Need a ride? Exploring the influence of honey bee (*Apis mellifera*) nurse bee visitation rates and cuticle compounds on cell invasion by the mite *Varroa destructor*. **Taylor Reams** (tdreams@tamu.edu) and Juliana Rangel, Texas A&M Univ., College Station, TX

Oral Presentations

10:20 **1019** Parental thermal history influences offspring characteristics. **Kayla Earls** (kayla.earls@ndsu.edu)¹, Monique Porter², Joseph P. Rinehart³ and Kendra Greenlee¹, ¹North Dakota State Univ., Fargo, ND, ²Pennsylvania State Univ., University Park, PA, ³USDA - ARS, Fargo, ND

10:30 **1020** Bumble bee (*Bombus impatiens*) queens' diapause survival is affected by age, mass, and post-eclosion nutrient acquisition. **Erin Treanore** (ezt5142@psu.edu), Monique Porter and Etya Amsalem, Pennsylvania State Univ., University Park, PA

10:40 **1021** Antimicrobial effects of hive products on honey bee brood disease, European foulbrood (*Melissococcus plutonius*). **Stephanie Murray** (murray.968@osu.edu)¹, Colin Kurkul² and Reed Johnson¹, ¹The Ohio State Univ., Wooster, OH, ²The Ohio State Univ., Columbus, OH

10:50 **1022** Differential infection intensity based on route of viral infection in honey bee (*Apis mellifera*) queens. **Sarah Lang** (slang7@lsu.edu)¹, Kristen Healy¹, Michael Simone-Finstrom² and Jeff Davis¹, ¹Louisiana State Univ., Baton Rouge, LA, ²USDA - ARS, Baton Rouge, LA

11:00 **1023** The cost of immune responses to thermoregulatory capacity in *Bombus impatiens*. **Hannah Stewart** (hus60@psu.edu) and Ruud Schilder, Pennsylvania State Univ., University Park, PA

11:10 **1024** The influence of body size on metabolic rate in *Megachile rotundata*. **Courtney Grula** (courtney.grula@ndsu.edu)¹, Kendra Greenlee¹, Joseph P. Rinehart² and Julia Bowsher¹, ¹North Dakota State Univ., Fargo, ND, ²USDA - ARS, Fargo, ND

Grad 10-min: PBT, Toxicity 2

Room 274 (America's Center)

Moderators: Troy Anderson¹ and Aaron Gross², ¹Univ. of Nebraska, Lincoln, NE, ²Virginia Polytechnic Institute and State Univ., Blacksburg, VA

10:10 **1025** Survey of neonicotinoid levels in native bees of the Mississippi Black Belt Prairie. **Sena Isbilir** (si240@msstate.edu)¹, Bailey Howard, JoVonn Hill, Ashli Brown Johnson and Jonas G. King, Mississippi State Univ., Mississippi State, MS

10:20 **1026** Sub-lethal effects of diamide insecticide exposure to honey bees. **Jennifer Williams** (jwilliams90@huskers.unl.edu)¹, Daniel Swale² and Troy Anderson¹, ¹Univ. of Nebraska, Lincoln, NE, ²Louisiana State Univ., Baton Rouge, LA

10:30 **1027** Honey bee (*Apis mellifera* L.) nursing behavior to larvae reared in pesticide-laden beeswax. **Elizabeth Walsh** (walshe@tamu.edu), Anjel Helms and Juliana Rangel, Texas A&M Univ., College Station, TX

10:40 **1028** A comparison of honey bee (*Apis mellifera*) larval toxicity to a field-relevant pesticide mixture across stocks. **Joseph Milone** (jmpilone@ncsu.edu) and David Tarpy, North Carolina State Univ., Raleigh, NC

10:50 **1029** Connecting the dots: Pesticide usage and hive residues of blueberry pollination. **Chelsea Abegg** (cka35@njAES.rutgers.edu)¹, Dean Polk¹ and Cesar Rodriguez², ¹Rutgers, The State Univ. of New Jersey, Bridgeton, NJ, ²Rutgers, The State Univ. of New Jersey, Chatsworth, NJ

11:00 **1030** Manipulating pollen macronutrient ratios to improve honey bee (*Apis mellifera*) resilience to pesticide stress. **Makaylee Crone** (mkc206@psu.edu)¹, David Biddinger² and Christina M. Grozinger¹, ¹Pennsylvania State Univ., University Park, PA, ²Pennsylvania State Univ. Fruit Research and Extension Center, Biglerville, PA

11:10 **1031** Impacts of neonicotinoid pesticides on insect olfactory processing. **Anna Tatarko** (atatarko09@gmail.com), Anne Leonard and Dennis Mathew, Univ. of Nevada, Reno, NV

11:20 **1032** Quantification of neonicotinoid residues in pollen and nectar. **Maura Hall** (mjhall@iastate.edu), Viet Dang, Matthew O'Neal, Steven Bradbury and Joel Coats, Iowa State Univ., Ames, IA

11:30 **1033** Examining *Varroa destructor* populations while screening for acaricide resistance in three geographic regions of Virginia. **Morgan Roth** (mroth11@vt.edu), James M. Wilson and Aaron Gross, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

Grad 10-min: P-IE, Apiculture

Room 223 (America's Center)

Moderators: Hongmei Li-Byarlay¹ and Melissa Siebert², ¹Central State Univ., Wilberforce, OH, ²Corteva Agriscience, Greenville, MS

10:10 **1034** Within-colony transmission of bumble bee and honey bee pathogens. **Mario Pinilla** (mspinill@ncsu.edu)¹, Jacquelyn Fitzgerald¹, Emma Williams², Abby Davis², Scott McArt² and Rebecca E. Irwin¹, ¹North Carolina State Univ., Raleigh, NC, ²Cornell Univ., Ithaca, NY

10:20 **1035** How propolis affects the honey bee (*Apis mellifera*) mouth microbiome. **Hollie Dalenberg** (dalene034@umn.edu)¹, Patrick Maes², Brendon Mott³, Kirk E. Anderson³ and Marla Spivak¹, ¹Univ. of Minnesota, St. Paul, MN, ²Univ. of Arizona, Tucson AZ, ³USDA - ARS, Tucson, AZ

10:30 **1036** Molecular detection of parasites and pathogens of Utah feral honey bees, *Apis mellifera*. **Dylan Cleary** (dacleary@uark.edu) and Allen Szalanski, Univ. of Arkansas, Fayetteville, AR

10:40 **1037** Improved honey bee (*Apis mellifera*) colony health and reduced mortality result from three-year field trial of survey derived best management practices. **Kelly Kulhanek** (kkkulhanek@umd.edu) and Dennis vanEngelsdorp, Univ. of Maryland, College Park, MD

10:50 **1038** Measuring honey bee utilization of Conservation Reserve Program (CRP) pollinator plantings using DNA metabarcoding. **Harper McMinn-Sauder** (mcminn.9@osu.edu)¹, Rodney Richardson^{1,2}, Mike Smith³ and Reed Johnson⁴, ¹The Ohio State Univ., Columbus, OH, ²York Univ., Toronto, ON, Canada, ³Conservation Technology Information Center, West Lafayette, IN, ⁴The Ohio State Univ., Wooster, OH

11:00 **1039** Using DNA sequencing to determine which flower species honey bees (*Apis mellifera*) use when given access to reconstructed prairies. **Morgan Carr-Markell** (carrm163@umn.edu)¹, Erin Treiber¹, R. Scott Cornman², Deborah Iwanowicz³ and Marla Spivak¹, ¹Univ. of Minnesota, St. Paul, MN, ²USDA - ARS, Beltsville, MD, ³US Geological Survey, Charleston, WV

11:10 **1040** Prairies strips integrated into cropland improve honey bees forage in agricultural landscape. **Ge Zhang** (gezhang@iastate.edu)¹, Ashley St. Clair¹, Caroline Murray¹, Adam Dolezal², Randall Cass³, Lisa Schulte Moore¹, Amy Toth¹ and Matthew O'Neal¹, ¹Iowa State Univ., Ames, IA, ²Univ. of Illinois, Champaign, IL, ³Iowa State Univ. Extension and Outreach, Ames, IA

11:20 **1041** Biological attributes of *Aspergillus flavus* found in bee pollen in the presence and absence of pesticide contamination. **Jacob Torres** (jacobdt3@illinois.edu), Daniel Bush, Ling-Hsiu Liao, May Berenbaum and Adam Dolezal, Univ. of Illinois, Champaign, IL

Oral Presentations

11:30 **1042** Honey bee foraging preferences in an orchard and food crop landscape in northern Virginia. **Taylor Steele** (taylorsteele@vt.edu), Roger Schurch and Margaret Couvillon, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

Grad 10-min: P-IE, Behavior

Room 263 (America's Center)

Moderators: Hailey Shanovich¹ and Kristin Hamons², ¹Univ. of Minnesota, St. Paul, MN, ²Texas A&M Univ., College Station, TX

10:10 **1043** Resistance among sweetpotato lines to the root feeding complex. **Thomas Douglas** (tjd18@msstate.edu), Mississippi State Univ., Batesville, MS

10:20 **1044** Host effects on larvae and adults of plum curculio, *Conotrachelus nenuphar*. **Timothy Lampasona** (timlampasona@gmail.com)¹, Cesar Rodriguez-Saona², Clement Akotsen-Mensah¹ and Anne Nielsen¹, ¹Rutgers, The State Univ. of New Jersey, Bridgeton, NJ, ²Rutgers, The State Univ. of New Jersey, New Brunswick, NJ

10:30 **1045** Investigating *Drosophila suzukii* flight behavior with vertical a flight chamber and tethered flight assays. **Anh K. Tran** (aktran@umn.edu)¹, Mark Asplen² and William D. Hutchison¹, ¹Univ. of Minnesota, St. Paul, MN, ²Metropolitan State Univ., St. Paul, MN

10:40 **1046** *Cacopsylla pyricola* uses substrate-borne vibrations to communicate with and attract mates (Hemiptera: Psyllidae). **Dowen Jocson** (dowen.jocson@wsu.edu)¹, David R. Horton², Elizabeth Beers³ and David Crowder¹, ¹Washington State Univ., Pullman, WA, ²USDA - ARS, Wapato, WA, ³Washington State Univ., Wenatchee, WA

10:50 **1047** Preferred temperatures of male and female *Enchenopa binotata* treehoppers (Hemiptera: Membracidae) in a reproductive context. **Noah Leith** (noah.leith@slu.edu)¹ and Kasey Fowler-Finn^{1,2}, ¹Saint Louis Univ., St. Louis, MO, ²Living Earth Collaborative, St. Louis, MO

11:00 **1048** Effects of starvation on flight capacity of laboratory-reared *Halymorpha halys* (Hemiptera: Pentatomidae). **Rafael Carlesso Aita** (carle072@umn.edu), Aubree Kees, Brian Aukema, William D. Hutchison and Robert Koch, Univ. of Minnesota, St. Paul, MN

11:10 **1049** Energy allocation patterns in a girdling and a non-girdling caterpillar. **Brianna Trejo** (btrejo1@cub.uca.edu), David Dussourd and Matthew Gifford, Univ. of Central Arkansas, Conway, AR

11:20 **1050** Application of microbial pesticides change mite behavior. **Victoria Deren** (victoriaderen@gmail.com)¹, Fulya Baysal-Gurel² and Karla Addesso², ¹Tennessee State Univ., Nashville, TN, ²Tennessee State Univ., McMinnville, TN

11:30 **1051** Generalist spider mites behave on resistant maize while specialists do not. **Gunbharpur Gill** (gunn.gill@usu.edu)¹, Hsuan Lu², Steven Price³, Huyen Bui⁴, Richard Clark⁴ and Ricardo Ramirez¹, ¹Utah State Univ., Logan, UT, ²National Chung Hsing Univ., Taichung, Taiwan, ³Utah State Univ. Extension, Price, UT, ⁴Univ. of Utah, Salt Lake City, UT

11:40 **1052** Spatial arrangement of intraspecific plant diversity influences insect movement behavior through a field. **Kayleigh Hauri** (haurikay@msu.edu) and William Wetzel, Michigan State Univ., East Lansing, MI

11:50 **1053** Carrot weevils utilize volatile cues dominated by terpenes in host location. **Emily Justus** (justus.67@osu.edu) and Elizabeth Long, The Ohio State Univ., Wooster, OH

Grad 10-min: P-IE, Biocontrol of Insects 3

Room 264 (America's Center)

Moderators: Arthur Agnello¹ and Gabrielle LaTora², ¹Cornell Univ., Geneva, NY, ²Univ. of Florida, Gainesville, FL

10:10 **1054** Defining and mitigating the impacts of *Acanthococcus lagerstroemiae* management on beneficial non-target insects. **Anna Thurmond** (aat0015@auburn.edu)¹, David Held¹, Yan Chen² and Christopher Ranger³, ¹Auburn Univ., Auburn, AL, ²Louisiana State Univ., Hammond, LA, ³USDA - ARS, Wooster, OH

10:20 **1055** Landscape factors influencing crapemyrtle bark scale *Acanthococcus lagerstroemiae* Kuwana (Hemiptera: Eriococcidae). **Kyle Gilder** (kyle.gilder@tamu.edu)¹, Mengmeng Gu¹, Michael Merchant² and Kevin Heinz¹, ¹Texas A&M Univ., College Station, TX, ²Texas A&M AgriLife Extension Service, Dallas, TX

10:30 **1056** Direct and indirect effects of biopesticides on coccinellid predators associated with the crapemyrtle bark scale. **Giovana Franco** (gfranco@agcenter.lsu.edu)¹, Yan Chen² and Rodrigo Diaz¹, ¹Louisiana State Univ., Baton Rouge, LA, ²Louisiana State Univ., Hammond, LA

10:40 **1057** Quantifying the susceptibility of western corn rootworm larvae to entomopathogenic fungi. **Abigail Kropf** (alkropf@iastate.edu) and Aaron J. Gassmann, Iowa State Univ., Ames, IA

10:50 **1058** Macronutrients affect susceptibility of *Helicoverpa zea* (Lepidoptera: Noctuidae) to *Helicoverpa armigera* nucleopolyhedrovirus. **Joseph Black** (jblack@tamu.edu), Spence Behmer, Micky Eubanks, Ashley Tessnow and Gregory Sword, Texas A&M Univ., College Station, TX

11:00 **1059** *Helicoverpa zea* nudivirus 2: A novel control agent for corn earworm (*H. zea*). Bruce Webb and **Emrah Ozel** (ezo222@uky.edu), Univ. of Kentucky, Lexington, KY

11:10 **1060** Egg predation of fall armyworm (*Spodoptera frugiperda*) in the push-pull system. **Tim Luttermoser** (tjl235@cornell.edu)¹, Annika Salzberg¹, Ryan O'Briant¹, André Kessler¹, Charles Midega², Zeyaur Khan² and Katja Poveda¹, ¹Cornell Univ., Ithaca, NY, ²International Centre of Insect Physiology and Ecology (icipe), Nairobi, Kenya

11:20 **1061** Plant-associated fungi affect soybean resistance and tolerance to cabbage loopers, *Trichoplusia ni*. **Leah Buchman** (lwb43@tamu.edu) and Gregory Sword, Texas A&M Univ., College Station, TX

11:30 **1062** Exploring the possibilities of using entomopathogenic nematodes for wireworm (Elateridae) management. **Ramandeep Sandhi** (ramandeepkaursandhi@montana.edu)¹, Gadi Reddy¹ and David Shapiro Ilan², ¹Montana State Univ., Conrad, MT, ²USDA - ARS, Byron, GA

11:40 **1063** Spatial and temporal distribution patterns of the predatory mite *Amblyseius swirskii* in a squash cropping system. **Lorena Lopez** (lorelopezq.257@ufl.edu) and Oscar Liburd, Univ. of Florida, Gainesville, FL

11:50 **1064** Coccinellid diets in simple and diverse agroecosystems: Metabarcoding to test the natural enemies hypothesis. **Hannah Gray** (grayx379@umn.edu)¹, Debora Pires Paula² and David Andow¹, ¹Univ. of Minnesota, St. Paul, MN, ²Embrapa, Brasilia, Brazil

12:00 **1065** Understanding non-consumptive effects of predators on bluegrass billbug (*Sphenophorus parvulus*) behavior: Implications for suppression in turfgrass. **Desireè Wickwar** (desiree.wickwar@gmail.com) and Ricardo Ramirez, Utah State Univ., Logan, UT

Oral Presentations

Grad 10-min: P-IE, Biocontrol of Plants

Room 265 (America's Center)

Moderators: Nicole Quinn¹ and Alyssa Piccolomini², ¹Virginia Polytechnic Institute and State Univ., Winchester, VA, ²Montana State Univ., Bozeman, MT

10:10 **1066** Population dynamics of the invasive Chinese tallow in Louisiana: Baseline data needed before biological control is initiated. **Dora Sevor** (dorasevor@gmail.com)¹, Veronica Manrique¹ and Rodrigo Diaz², ¹Southern Univ. and A&M College, Baton Rouge, LA, ²Louisiana State Univ., Baton Rouge, LA

10:20 **1067** Implementing biological control of air potato vine (*Dioscorea bulbifera*) in Louisiana. **Charity Schaffer** (charityschaffer@gmail.com)¹, Veronica Manrique² and Rodrigo Diaz³, ¹Southern Univ. and A&M College, Greensburg, LA, ²Southern Univ. and A&M College, Baton Rouge, LA, ³Louisiana State Univ., Baton Rouge, LA

10:30 **1068** Insect herbivores and plant pathogens associated with *Conyza bonariensis* (Asterales: Asteraceae) in Louisiana, Texas and Mississippi. **Carlos Wiggins** (cwiggins@agcenter.lsu.edu)¹, Nathan Lord¹, Sathyamurthy Raghu² and Rodrigo Diaz¹, ¹Louisiana State Univ., Baton Rouge, LA, ²CSIRO, Brisbane, QLD, Australia

10:40 **1069** How chemical ecologically based behavioral bioassays can inform post-release host selection predictions in weed biological control: An update. **Jessica Fung** (jfung@uidaho.edu)¹, Mark Schwarzländer¹, Urs Schaffner², Karuna Nepal¹ and Sanford Eigenbrode¹, ¹Univ. of Idaho, Moscow, ID, ²CABI, Delémont, Switzerland

10:50 **1070** Presentation withdrawn

11:00 **1071** Development of a novel aerial-release system for *Rhinoncomimus latipes* (Coleoptera: Curculionidae), the biological control agent for mile-a-minute weed. **Jaewon Kim** (jk0112@mix.wvu.edu)¹, Richard Reardon² and Yong-Lak Park¹, ¹West Virginia Univ., Morgantown, WV, ²USDA - Forest Service, Morgantown, WV

11:10 **1072** Evaluating the impact of two herbivores on the invasive Brazilian peppertree, *Schinus terebinthifolia*. **Kristen Bowers** (kebowers@ufl.edu), Eutychus Kariuki and Carey Minteer, Univ. of Florida, Fort Pierce, FL

11:20 **1073** Brazilian peppertree: Investigation of plant chemical defenses in weed biological control systems. **Patricia Prade** (prade@ufl.edu)¹, Shawn Christensen², Carey Minteer¹ and James Cuda³, ¹Univ. of Florida, Fort Pierce, FL, ²USDA - ARS, Gainesville, FL, ³Univ. of Florida, Gainesville, FL

Grad 10-min: P-IE, Ecology 3

Room 262 (America's Center)

Moderators: Eric Rebek¹ and Holly Shugart², ¹Oklahoma State Univ., Stillwater, OK, ²Univ. of Florida, Lake Alfred, FL

10:10 **1074** Food quality effects on host life histories: Implications for host susceptibility to parasitoids. **Leslie Holmes** (12lh22@queensu.ca), William Nelson and Stephen Lougheed, Queen's Univ., Kingston, ON, Canada

10:20 **1075** Impact of tree biodiversity on insect-mediated canopy processes. **Taylor Nelson** (tmnelson@purdue.edu)¹, Lorenzo Cotrozz², Gordon McNickle¹, Brady Hardiman¹, Douglas Jacobs¹ and John Couture¹, ¹Purdue Univ., West Lafayette, IN, ²Università di Pisa, Pisa, Italy

10:30 **1076** An attempt to use flowering vegetables to augment rice pest management. **Corey Riedel** (coreyr14@vt.edu) and Douglas G. Pfeiffer, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

10:40 **1077** Examining pollinators and pollen limitation throughout the range of Venus flytrap. **Laura Hamon** (lehamon@ncsu.edu), Elsa Youngsteadt, Clyde Sorenson and Rebecca E. Irwin, North Carolina State Univ., Raleigh, NC

10:50 **1078** The very hungry caterpillars: Influences of tillage and rotation on plant-insect interactions. **Emily Althoff** (era2n4@missouri.edu) and Kevin Rice, Univ. of Missouri, Columbia, MO

11:00 **1079** Contribution of different host plants to the adult population of western bean cutworm. **Dakota Bunn** (dbunn1@hawk.iit.edu)¹, Eduardo Dias de Oliveira², Miquel Gonzalez-Meler² and Nicholas Miller¹, ¹Illinois Institute of Technology, Chicago, IL, ²Univ. of Illinois, Chicago, IL

11:10 **1080** Are females better listeners? Interactions between herbivore bioacoustics and chemical defenses in dioecious plants. **Layne Leake** (llbc8c@mail.missouri.edu), Sabrina Michael, Reginald Cocroft and Kevin Rice, Univ. of Missouri, Columbia, MO

11:20 **1081** Altitudinal patterns of *Formica* ant nest soil properties in California mountains. **Madison Sankovitz** (madison.sankovitz@email.ucr.edu) and Jessica Purcell, Univ. of California, Riverside, CA

11:30 **1082** Bt soybean fields have no adverse effects on non-target arthropod communities in South Africa. **Nadine Schutte** (nadineschutte2@gmail.com) and Johnnie Van den Berg, North-West Univ., Potchefstroom, South Africa

11:40 **1083** Presentation withdrawn

11:50 **1084** Bee species-area relationships (SARs) are weakened by the reintroduction of a vertebrate top predator in a highly fragmented, endemic habitat. **Nicholas Anderson** (nlndrsn2@illinois.edu) and Alexandra Harmon-Threath, Univ. of Illinois, Champaign, IL

Grad 10-min: P-IE, Forests

Room 280 (America's Center)

Moderators: Heather Leach¹ and Warren Sconiers², ¹Pennsylvania State Univ., University Park, PA, ²North Carolina State Univ., Raleigh, NC

10:10 **1085** The non-target effects of imidacloprid on soil collembolans and mites in hemlock forests. **Braley Burke** (brburke@mix.wvu.edu), Donald Brown and Yong-Lak Park, West Virginia Univ., Morgantown, WV

10:20 **1086** Protecting trees against emerald ash borer: What does it take to be a good neighbour? **Dora Mwangola** (mwang022@umn.edu)¹, Aubree Kees¹, Jennifer Burrington², Angie Ambourn², Mark Abrahamson² and Brian Aukema¹, ¹Univ. of Minnesota, St. Paul, MN, ²Minnesota Dept. of Agriculture, St. Paul, MN

10:30 **1087** Avoidance of *Ips grandicollis* to pheromones of a novel competitor *Dendroctonus ponderosae*. **Zach Smith** (smit7048@morris.umn.edu)¹, Etsuro Takagi², Aubree Kees³, Kevin Chase³ and Brian Aukema³, ¹Univ. of Minnesota, Falcon Heights, MN, ²Tokyo Metropolitan Univ., Tokyo, Japan, ³Univ. of Minnesota, St. Paul, MN

10:40 **1088** A novel adhesive trunk trap net for trapping *Eucryptorrhynchus brandti* (Coleoptera: Curculionidae). **Kailang Yang** (yangkl0423@163.com), Beijing Forestry Univ., Beijing, China

Oral Presentations

10:50 **1089** Spatial and climatic predictors of ambrosia beetle (Coleoptera: Curculionidae) abundance inferred from long-term monitoring data in intensively managed plantations of eastern black walnut. **Geoffrey Williams** (will1809@purdue.edu) and Matthew Ginzel, Purdue Univ., West Lafayette, IN

11:00 **1090** Emerald ash borer performance on novel host plants: Cultivated olive and white fringetree. **Donnie L. Peterson** (peterson.143@wright.edu) and Don Cipollini, Wright State Univ., Dayton, OH

11:10 **1091** Using Bayesian statistical methods to estimate the effective attraction radius of a short-range sex pheromone of emerald ash borer (*Agrilus planipennis*) in baited traps. **Jacob Wittman** (wittm094@umn.edu)¹, Katie Blain², Krista Ryall³, Peter Silk⁴ and Brian Aukema¹, ¹Univ. of Minnesota, St. Paul, MN, ²Forestry Commission UK, Bristol, United Kingdom, ³Natural Resources Canada, Sault Ste. Marie, ON, Canada, ⁴Natural Resources Canada, Fredericton, NB, Canada

11:20 **1092** Early reproductive ecology of velvet longhorned beetle, *Trichoferus campestris*, in cut logs of various potential hosts. **A. Grace Haynes** (a.gr.haynes@gmail.com)¹, Marissa Streifel², Angie Ambourn² and Brian Aukema¹, ¹Univ. of Minnesota, St. Paul, MN, ²Minnesota Dept. of Agriculture, St. Paul, MN

11:30 **1093** Larval resource acquisition determines adult allocation for an invasive forest pest. **Chelsea Jahant-Miller** (cjahant@syr.edu) and Dylan Parry, State Univ. of New York, Syracuse, NY

11:40 **1094** Effects of latitudinal variation on emerald ash borer development and parasitoid efficacy. **Sarah Pellecchia** (sarah.pellecchia@uky.edu) and Lynne Rieske, Univ. of Kentucky, Lexington, KY

11:50 **1095** Effects of novel host plant substrate on host utilization of two larval parasitoids of emerald ash borer. **Max Ragozzino** (maxri@vt.edu)¹, Scott Salom¹ and Jian Duan², ¹Virginia Polytechnic Institute and State Univ., Blacksburg, VA, ²USDA - ARS, Newark, DE

Grad 10-min: P-IE, Host Plant Resistance

Room 242 (America's Center)

Moderators: Louis Hesler¹ and Hector E. Portillo², ¹USDA - ARS, Brookings, SD, ²FMC Agricultural Solutions, Newark, DE

10:10 **1096** Getting more Zs: Can zinc fertilizer boost corn resistance to chewing herbivores? **Elizabeth Rowen** (epr5119@psu.edu) and John Tooker, Pennsylvania State Univ., University Park, PA

10:20 **1097** Resistance of sugarcane cultivars to the sugarcane borer: *Diatraea saccharalis*. **Leonardo Salgado** (lsalgado@agcenter.lsu.edu) and Blake Wilson, Louisiana State Univ., Baton Rouge, LA

10:30 **1098** Underground cooperation helps to increase rice yield after herbivore injury. **Lina Bernaola** (lbernaola@agcenter.lsu.edu) and Mike Stout, Louisiana State Univ., Baton Rouge, LA

10:40 **1099** Effects of tree ontogeny and genotype on variation in insect resistance in trembling aspen. **Olivia Cope** (ocope@wisc.edu)¹, Eric Kruger¹, Kennedy Rubert-Nason^{1,2} and Richard L. Lindroth¹, ¹Univ. of Wisconsin, Madison, WI, ²Univ. of Maine, Fort Kent, ME

10:50 **1100** Identifying novel sources of resistance in sorghum against sugarcane aphids. **Sajjan Grover** (sajjan.grover@huskers.unl.edu)¹, Earl Agpawa¹, Scott E. Sattler² and Joe Louis¹, ¹Univ. of Nebraska, Lincoln, NE, ²USDA - ARS, Lincoln, NE

11:00 **1101** Reactive oxygen species in plant defense against aphids. **Hillary Fischer** (hdfische@uark.edu) and Fiona L. Goggin, Univ. of Arkansas, Fayetteville, AR

11:10 **1102** Understanding host plant resistance to the roseau cane scale: Quantification of lipids, phenolics and silica of *Phragmites australis* varieties. **Leslie Aviles** (laviles@agcenter.lsu.edu), Ian Knight, James T. Cronin, Mike Stout and Rodrigo Diaz, Louisiana State Univ., Baton Rouge, LA

11:20 **1103** Characterization of antibiosis, antixenosis, and tolerance to bird cherry-oat aphid (*Rhopalosiphum padi*) in wheat germplasm. **Grace Levy** (gracej67@gmail.com), Ali Zarrabi, Kristopher Giles, Tom Royer, Brett Carver and Mark Payton, Oklahoma State Univ., Stillwater, OK

11:30 **1104** Microbes armor plants: Arbuscular Mycorrhizal Fungi (AMF) influence the insect community dynamics in sorghum-sudangrass (*Sorghum drummondii*). **Jasleen Kaur** (jasleen.kaur01@utrgv.edu), Alexis Racelis, Pushpa Soti and Rupesh Kariyat, Univ. of Texas, Edinburg, TX

11:40 **1105** Plants under attack: Maize phytohormonal crosstalk during multiple biotic stressors. **Karen Ferreira da Silva** (kfdsilva@huskers.unl.edu), Joe Louis and Sydney Everhart, Univ. of Nebraska, Lincoln, NE

11:50 **1106** Identification of exotic upland cotton landraces that reduce thrips injury. **Sophia Conzemius** (sconzem@g.clemson.edu)¹, Francis Reay-Jones², Jeremy Greene¹, Benjamin Campbell³ and Dominic Reisig⁴, ¹Clemson Univ., Blackville, SC, ²Clemson Univ., Florence, SC, ³USDA - ARS, Florence, SC, ⁴North Carolina State Univ., Plymouth, NC

12:00 **1107** Arabidopsis defense against green peach aphid: Role of sphingolipid metabolism. **Kaitlin Chapman** (karmit.chapman@gmail.com), Jonathan Markham, Tiffany Heng-Moss and Joe Louis, Univ. of Nebraska, Lincoln, NE

Grad 10-min: P-IE, IPM Field Crops 2

Room 230 (America's Center)

Moderators: Amanda Hodges¹ and Teresia Nyoike², ¹Univ. of Florida, Gainesville, FL, ²BASF Corporation, Research Triangle Park, NC

10:10 **1108** Assay method development for monitoring diamide resistance in *Helicoverpa zea*. **Beverly Catchot** (bdc12@msstate.edu)¹, Fred Musser¹, Jeremy Greene² and Gus Lorenz³, ¹Mississippi State Univ., Mississippi State, MS, ²Clemson Univ., Blackville, SC, ³Univ. of Arkansas, Lonoke, AR

10:20 **1109** *Helicoverpa zea* incidence and susceptibility to Bt corn across North Carolina and South Carolina in relation to agroecosystem composition. **Benjamin Arends** (brarends@ncsu.edu)¹, Shawnee Gundry¹, Kristen Hopperstad¹, Francis Reay-Jones², Jeremy Greene³, Anders Huseth¹, George Kennedy¹ and Dominic Reisig⁴, ¹North Carolina State Univ., Raleigh, NC, ²Clemson Univ., Florence, SC, ³Clemson Univ., Blackville, SC, ⁴North Carolina State Univ., Plymouth, NC

10:30 **1110** Effect of Bt expression and supplementary insecticide treatment on the spatial distribution of bollworm (*Helicoverpa zea*) larvae within the cotton canopy. **Dawson Kerns** (dkerns1@vols.utk.edu)¹, Scott Stewart¹, David Kerns², Angus Catchot³ and Gus Lorenz⁴, ¹Univ. of Tennessee, Jackson, TN, ²Texas A&M Univ., College Station, TX, ³Mississippi State Univ., Mississippi State, MS, ⁴Univ. of Arkansas, Lonoke, AR

10:40 **1111** Management of *Helicoverpa zea* (Boddie) in cotton. **Michael Francis** (mcf188@msstate.edu), Mississippi State Univ., Mississippi State, MS

Oral Presentations

10:50 **1112** Identifying landscape level contributions of corn earworm (*Helicoverpa zea*) in Bt and non-Bt field corn. **Tyler Towles** (tt305@entomology.msstate.edu)¹, Angus Catchot¹, Jeff Gore², Don Cook², Michael Caprio¹ and Christopher Daves³, ¹Mississippi State Univ., Mississippi State, MS, ²Mississippi State Univ., Stoneville, MS, ³Bayer Crop Science, Coila, MS

11:00 **1113** Insect pest concerns and management in Virginia hemp. **Kadie Britt** (kadieb@vt.edu) and Thomas Kuhar, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

11:10 **1114** Occurrence and proportion of *Helicoverpa armigera* (Hubner) and *H. zea* (Boddie) (Lepidoptera: Noctuidae) in corn and soybean in Puerto Rico. **Xiomara Flores-Rivera** (x.floresrivera@ufl.edu)^{1,2}, Silvana Paula-Moraes¹, James Johnson³ and Omaththage Perera⁴, ¹Univ. of Florida, Jay, FL, ²Syngenta Seeds, Salinas, PR, ³Syngenta Crop Protection, Greensboro, NC, ⁴USDA - ARS, Stoneville, MS

11:20 **1115** Evaluation of the rainfastness of selected insecticides in cotton. **Sara Barrett** (sarainez17@gmail.com)¹, Jeff Gore², Angus Catchot³, Don Cook² and Darrin Dodds³, ¹Mississippi State Univ., Isola, MS, ²Mississippi State Univ., Stoneville, MS, ³Mississippi State Univ., Mississippi State, MS

11:30 **1116** *Helicoverpa zea* damage and behavior in Bt cotton. **Russell Godbold** (reg194@msstate.edu), Mississippi State Univ., Cleveland, MS

11:40 **1117** Movement and longevity of soil applied chlorantraniliprole in tobacco. **Gabriel Zilnik** (gzilnik@ncsu.edu) and Hannah Burrack, North Carolina State Univ., Raleigh, NC

11:50 **1118** Performance of Bt-susceptible and heterozygous dual-gene resistant genotypes of the fall armyworm in seed blends of non-Bt and pyramided Bt corn. **Marcelo Dimase** (mdimases2@lsu.edu)¹, Sebe Brown², Wade Walker², Graham P. Head³, Paula A. Price⁴, Wenbo Yu¹ and Fangneng Huang¹, ¹Louisiana State Univ., Baton Rouge, LA, ²Louisiana State Univ., Winnsboro, LA, ³Bayer Crop Science, Chesterfield, MO, ⁴Bayer Crop Science, St. Louis, MO

12:00 **1119** Susceptibility of fall armyworm (*Spodoptera frugiperda*) genotypes carrying Vip3A resistant alleles, to Bt plants and purified Bt proteins. **Ryan Gilreath** (rtg006@tamu.edu), David Kerns and Fei Yang, Texas A&M Univ., College Station, TX

10:40 **1123** Dual-cropping soybean systems: Impacts on pest and beneficial arthropods in Tennessee. **Matthew Longmire** (mlongmir@vols.utk.edu)¹, Jerome Grant¹, Scott Stewart² and Virginia Sykes¹, ¹Univ. of Tennessee, Knoxville, TN, ²Univ. of Tennessee, Jackson, TN

10:50 **1124** Associating site factor and plant productivity variables with pestiferous and beneficial arthropod distributions in soybean. **Anthony Greene** (adg2@clemson.edu)¹, Francis Reay-Jones², Brandon Peoples³, Kendall Kirk¹ and Jeremy Greene¹, ¹Clemson Univ., Blackville, SC, ²Clemson Univ., Florence, SC, ³Clemson Univ., Clemson, SC

11:00 **1125** Disruption of arthropod communities by pesticide seed treatments in a grain crop rotation. **Aditi Dubey** (aditid26@gmail.com), Galen Dively, Margaret Lewis and Kelly Hamby, Univ. of Maryland, College Park, MD

11:10 **1126** Cover crop diversity encourages insect diversity in annual cropland: A citizen science project. **Alex Michels** (alex.michels@ecdysis.bio)^{1,2} and Jonathan Lundgren², ¹South Dakota State Univ., Brookings, SD, ²Ecdysis Foundation, Estelline, SD

11:20 **1127** The impact of cover crops on arthropod activity in a corn production system. **Julia Campos** (julia.nog.campos@gmail.com), Anthony McMechan and Robert Wright, Univ. of Nebraska, Lincoln, NE

11:30 **1128** Effects of brown stink bug (*Euschistus servus*) damage on early vegetative stage corn and yield loss. **William Hardman** (wch176@msstate.edu)¹, Don Cook¹, Jeff Gore¹, Angus Catchot² and William Henry², ¹Mississippi State Univ., Stoneville, MS, ²Mississippi State Univ., Mississippi State, MS

11:40 **1129** Brown stink bug, *Euschistus servus*, management in seedling field corn. **Tim Bryant** (btim2@vt.edu)¹, Roger Schurch² and Sally Taylor¹, ¹Virginia Polytechnic Institute and State Univ., Suffolk, VA, ²Virginia Polytechnic Institute and State Univ., Blacksburg, VA

11:50 **1130** Population dynamics of *Chrysodeixis includens* in the Florida Panhandle and pheromone interspecific cross-attraction of other lepidopterans in the region. **Tyler Shaw** (tshaw@ufl.edu)¹, Silvana Paula-Moraes² and Latisha Ledbetter-Kish², ¹Univ. of Florida, Milton, FL, ²Univ. of Florida, Jay, FL

Grad 10-min: P-IE, IPM Field Crops 4

Room 231 (America's Center)

Moderators: Shiva Bhattarai¹ and John Adamczyk², ¹Tribhuwan Univ., Rupandehi, Nepal, ²USDA - ARS, Poplarville, MS

10:10 **1120** Linking habitat, diversity, and predator function
Unraveling the trophic effects of cover crops. **Carson Bowers**
(carson.bowers@uga.edu)¹, Michael Toews¹ and Jason Schmidt²,
¹Univ. of Georgia, Tifton, GA, ²Michigan State Univ., East Lansing, MI

10:20 **1121** Influence of cover crop management tactics on
arthropods in a cover crop to corn system. **Gabriela Inveninato**
Carmona (gabiinveninato@gmail.com) and Anthony McMechan,
Univ. of Nebraska, Lincoln, NE

10:30 **1122** Pest and beneficial invertebrates in Illinois cover
crop systems. **L. Brodie Dunn** (lbdunn2@illinois.edu)¹, Nick Seiter¹,
Ashley Decker¹, Jennifer Woodyard², Kenneth Johnson II³, Duane
Friend³, Talon Becker⁴, Jessica Soule⁵ and Nathan Johanning⁶, ¹Univ
of Illinois, Champaign, IL, ²Univ. of Illinois Extension, Effingham, IL,
³Univ. of Illinois Extension, Jacksonville, IL, ⁴Univ. of Illinois Extension
Benton, IL, ⁵Univ. of Illinois Extension, Marshall, IL, ⁶Univ. of Illinois
Extension, Murphysboro, IL

10:40 **1123** Dual-cropping soybean systems: Impacts on pest and beneficial arthropods in Tennessee. **Matthew Longmire** (mlongmir@vols.utk.edu)¹, Jerome Grant¹, Scott Stewart² and Virginia Sykes¹, ¹Univ. of Tennessee, Knoxville, TN, ²Univ. of Tennessee, Jackson, TN

10:50 **1124** Associating site factor and plant productivity variables with pestiferous and beneficial arthropod distributions in soybean. **Anthony Greene** (adg2@clemson.edu)¹, Francis Reay-Jones², Brandon Peoples³, Kendall Kirk¹ and Jeremy Greene¹, ¹Clemson Univ., Blackville, SC, ²Clemson Univ., Florence, SC, ³Clemson Univ., Clemson, SC

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11:50 **1130** Population dynamics of *Chrysodeixis includens* in the Florida Panhandle and pheromone interspecific cross-attraction of other lepidopterans in the region. **Tyler Shaw** (tshaw@ufl.edu)¹, Silvana Paula-Moraes² and Latisha Ledbetter-Kish², ¹Univ. of Florida, Milton, FL, ²Univ. of Florida, Jay, FL

Grad 10-min: P-IE, IPM Horticulture

Room 232 (America's Center)

Moderators: Phil Mulder¹ and Robert Koch², ¹Oklahoma State Univ., Stillwater, OK, ²Univ. of Minnesota, St. Paul, MN

10:10 **1131** Impact of plastic and biodegradable mulch films on management of *Drosophila suzukii*, fruit yield and quality, and soil health in raspberry. **Hanna McIntosh** (hrmcintosh@wisc.edu), Amaya Atucha, Beth Workmaster and Christelle Guédot, Univ. of Wisconsin, Madison, WI

10:20 **1132** Susceptibility of two emerging tea crops and their ornamental congeners to tea scale, *Fiorinia theae*. **Matthew Borden** (m.borden@ufl.edu) and Adam Dale, Univ. of Florida, Gainesville, FL

10:30 **1133** Can IPM replace prophylactic insecticides in Midwestern cropping systems? **Jacob Pecenka** (jacob.pecenka@gmail.com), Laura Ingwell, Rick Foster, Christian Krupke and Ian Kaplan, Purdue Univ., West Lafayette, IN

Oral Presentations

10:40 **1134** Extended holding period and yeast hydrolysate supplementation prior to release enhances survival and dispersal of sterile Queensland fruit fly in the field. **Md Jamil Hossain Biswas** (md-jamil-hossain.biswas@students.mq.edu.au), Macquarie Univ., Marsfield, NSW, Australia

10:50 **1135** Effect of domestication on quality control parameters of the Queensland fruit fly, *Bactrocera tryoni* (Froggatt). **Sushil Gaire** (sushil-kumar.gaire@students.mq.edu.au), Macquarie Univ., Marsfield, NSW, Australia

11:00 **1136** Optimizing carrier water volume for improved management of spotted-wing drosophila in brambles. **Margaret Lewis** (mtlewis@umd.edu) and Kelly Hamby, Univ. of Maryland, College Park, MD

11:10 **1137** Exploiting soil legacy effects as a tool for crop and pest management in high tunnels. **Wadih Ghanem** (wghanem@purdue.edu) and Ian Kaplan, Purdue Univ., West Lafayette, IN

11:20 **1138** Deterrent effects of essential oils on spotted-wing drosophila (*Drosophila suzukii*): Implications for organic management. **Matthew Gullickson** (gulli139@umn.edu), Claire Hodge and Mary Rogers, Univ. of Minnesota, St. Paul, MN

11:30 **1139** Influence of chemical and cultural control strategies for managing squash bug, *Anasa tristis* (Hemiptera: Coreidae), on its egg parasitoid, *Gryon pennsylvanicum* (Hymenoptera: Scelionidae). **Sean Boyle** (seanboyle@vt.edu)¹, Thomas Kuhar¹ and Donald C. Weber², ¹Virginia Polytechnic Institute and State Univ., Blacksburg, VA, ²USDA - ARS, Beltsville, MD

11:40 **1140** Assessment of plum curculio activity in Southeastern peach orchards. **Tzu-Chin Liu** (jean2036@uga.edu) and Brett Blaauw, Univ. of Georgia, Athens, GA

11:50 **1141** Can the use of traps improve picture-winged fly (Diptera: Ulidiidae) management in Florida sweet corn? **Eric Schwan** (eric.schwan@hotmail.com)¹, Julien Beuzelin¹, Carolina Tieppo Camarozano¹, Dakshina Seal², Sandra Allan³, Gregg Nuessly¹ and Donna Larsen¹, ¹Univ. of Florida, Belle Glade, FL, ²Univ. of Florida, Homestead, FL, ³USDA - ARS, Gainesville, FL

Grad 10-min: P-IE, Molecular and Cell Biology / Novel Tools

Room 224 (America's Center)

Moderators: Christelle Guédot¹ and Paul Bergeron², ¹Univ. of Wisconsin, Madison, WI, ²Clemson Univ., Clemson, SC

10:10 **1142** Using RNA interference in the soybean aphid (*Aphis glycines*) to functionally evaluate genes involved in adaptation to host-plant resistance. **Ashley Yates-Stewart** (yates.229@buckeyemail.osu.edu)¹, Anna Favalon^{1,2}, Joshua Blakeslee¹ and Andrew Michel¹, ¹The Ohio State Univ., Wooster, OH, ²Trine Univ., Angola, IN

10:20 **1143** Identifying single nucleotide polymorphisms (SNPs) for the Asiatic garden beetle, *Maladera castanea* Arrow, using a RAD-seq approach. **Adrian Pekarcik** (pekarcik.4@osu.edu), Andrew Michel and Kelley Tilmon, The Ohio State Univ., Wooster, OH

10:30 **1144** Optimizing RNA interference in fall armyworm, *Spodoptera frugiperda*, using improved nanoparticles. **Ana Trabanino** (trabaninopino.1@buckeyemail.osu.edu), Yosra Helmy, Gireesh Rajashekara and Andrew Michel, The Ohio State Univ., Wooster, OH

10:40 **1145** Can we monitor whitefly infestation in soybean plants using remote sensing technology? **Fernando lost Filho** (fernando.lost@usp.br)¹, Ana Clara Paiva¹, Pedro Barros¹, David Rosalen², Peterson Fiorio¹ and Pedro Yamamoto¹, ¹Univ. de São Paulo, Piracicaba, Brazil, ²Univ. Estadual Paulista, Jaboticabal, Brazil

10:50 **1146** Greater wax moth, *Galleria mellonella*, diet optimization and nutrient accumulation. **Mauri Hickin** (mhickin@ncsu.edu)^{1,2} and Allen C. Cohen¹, ¹North Carolina State Univ., Raleigh, NC, ²USDA - APHIS, Buzzards Bay, MA

11:00 **1147** A method for detecting microplastic ingestion by terrestrial arthropods. **Maxwell Helmberger** (helmberg@mssu.edu), Melinda Frame and Matthew Grieshop, Michigan State Univ., East Lansing, MI

11:10 **1148** Lignin nanoparticles as a novel IPM tactic. **Colin Bonser** (cbonser2@lsu.edu), Carlos Astete, Cristina Sabliov and Jeffrey Davis, Louisiana State Univ., Baton Rouge, LA

11:20 **1149** A novel use of protein immunomarking in studying the dispersal of woodboring beetles. **Scott Gula** (sgula@purdue.edu)¹, Vanessa Lopez², Ann Ray³, Scott Machtley⁴, James Hagler⁴ and Matthew Ginzel¹, ¹Purdue Univ., West Lafayette, IN, ²USDA - Forest Service, Washington, DC, ³Xavier Univ., Cincinnati, OH, ⁴USDA - ARS, Maricopa, AZ

11:30 **1150** Congeneric effect of RNA interference leads to gene silencing in multiple *Dendroctonus* species. **Bethany Kyre** (bethkyre@gmail.com) and Lynne Rieske, Univ. of Kentucky, Lexington, KY

Grad 10-min: P-IE, Pollination 3

Room 224 (America's Center)

Moderators: Benjamin Savage¹ and Brian McCornack², ¹Michigan State Univ., East Lansing, MI, ²Kansas State Univ., Manhattan, KS

10:10 **1151** Native pollinator diversity on commercial watermelon farms and potential impacts from grower management. **John Terrest** (jterrest@ufl.edu)^{1,2}, Laura Ingwell², Rick Foster² and Ian Kaplan², ¹Univ. of Florida, Gainesville, FL, ²Purdue Univ., West Lafayette, IN

10:20 **1152** Diversity of pollinating insects in UK cherry orchards and ecosystem service delivery. **Zeus Mateos-Fierro** (z.mateosfierro@worc.ac.uk)¹, Michael Garratt², Michelle Fountain³, Kate Ashbrook¹ and Duncan Westbury¹, ¹Univ. of Worcester, Worcester, United Kingdom, ²Univ. of Reading, Reading, United Kingdom, ³NIAB EMR, Kent, United Kingdom

10:30 **1153** Do small patches of prairie conserve pollinators, including monarch butterfly, in an agricultural setting? **Caroline Murray** (cjcmurray@iastate.edu), Matthew O'Neal, Ge Zhang, Lisa Shulte Moore and John Tyndall, Iowa State Univ., Ames, IA

10:40 **1154** Presentation withdrawn

10:50 **1155** Bee-friendly beef: Using wildflowers in pastures for native bee conservation. **Jennie Wagner** (jenniew@vt.edu), Megan O'Rourke and Benjamin Tracy, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

11:00 **1156** Intraspecific variation in body size predicts flight distance in native bees: Implications for pollination services. **Sarah Elzay** (selzay@okstate.edu) and Kristen Baum, Oklahoma State Univ., Stillwater, OK

11:10 **1157** Survey of potential pollinators of black cherry. **Rachel McLaughlin** (rem418@psu.edu), Christina Grozinger and Kelli Hoover, Pennsylvania State Univ., University Park, PA

Oral Presentations

11:20 **1158** Pollinator plantings and farm landscapes: Impact on cucumber pollination and crop yield. **Erin Lowe** (eblowe@wisc.edu), Univ. of Wisconsin, Madison, WI

11:30 **1159** Evaluating the connectedness of pollinator networks between augmented pollinator habitat and adjacent cropping systems. **Hannah Levenson** (hklevens@ncsu.edu) and David Tarpy, North Carolina State Univ., Raleigh, NC

11:40 **1160** Impacts of prescribed burns on nesting communities of ground-nesting bees in tallgrass prairies. **Julia Brokaw** (julia.n.brokaw@gmail.com), Zachary Portman and Daniel Cariveau, Univ. of Minnesota, St. Paul, MN

11:50 **1161** Reciprocal benefits to cotton and bee pollinators in the cotton agroecosystem. **Isaac Esquivel** (iesqu002@tamu.edu)¹, Michael Brewer² and Robert Coulson¹, ¹Texas A&M Univ., College Station, TX, ²Texas A&M AgriLife Research, Corpus Christi, TX

Grad 10-min: P-IE, Vectors 2

Room 260 (America's Center)

Moderators: Benjamin Lee¹ and Jessica Kansman², ¹Washington State Univ., Pullman, WA, ²Univ. of Missouri, Columbia, MO

10:10 **1162** Identification of leafhopper vectors of aster yellows phytoplasma. **Patrick Stillson** (stillson@msu.edu) and Zsofia Szendrei, Michigan State Univ., East Lansing, MI

10:20 **1163** Influence of xenobiotic inputs on microbial composition and presence of aster yellows phytoplasma in *Macrosteles quadrilineatus* (Hemiptera: Cicadellidae). **Shannon Piper** (sbpiper@wisc.edu), Justin Clements and Russell Groves, Univ. of Wisconsin, Madison, WI

10:30 **1164** Intracellular penetration by *Macrosteles quadrilineatus* enhances *Salmonella enterica* persistence in the phyllosphere. **Victoria Lason** (lason@wisc.edu), Russell Groves and Jeri Barak, Univ. of Wisconsin, Madison, WI

10:40 **1165** Influence of beet curly top virus on host preference of its vector, *Circulifer tenellus*. **Hyoseok Lee** (hyslee@ucdavis.edu), Univ. of California, Davis, CA

10:50 **1166** Phenology of the meadow spittlebug, *Philaenus spumarius*, in California North Coast vineyards. **Dylan J. Beal** (dylan.beal@berkeley.edu) and Rodrigo P. P. Almeida, Univ. of California, Berkeley, CA

11:00 **1167** Potential insect vectors of grapevine red blotch associated virus in Missouri vineyards. **Harper Smith** (hfs5h4@mail.missouri.edu), Dean Volenberg and Debbie Finke, Univ. of Missouri, Columbia, MO

11:10 **1168** Effects of insect density and pest pressure on transmission of *Erwinia amylovora* by *Delia platura*. **Matthew Boucher** (mtb245@cornell.edu), Kerik Cox and Gregory Loeb, Cornell Univ., Geneva, NY

Grad 10-min: SysEB, Evolution 2

Room 130 (America's Center)

Moderator: Michael Caterino, Clemson Univ., Clemson, SC

10:10 **1170** Exploring mechanisms of parasitoid diversification through the lens of chemosensory speciation. **Kendall King** (king.2488@osu.edu), The Ohio State Univ., Columbus, OH

10:20 **1171** Using the isotropic fractionator method to quantify neuron number in insect brains: Trends and correlations with behavior in Hymenoptera. **R. Keating Godfrey** (rkeatinggodfrey@email.arizona.edu) and Wulfila Gronenberg, Univ. of Arizona, Tucson, AZ

10:30 **1172** Entomological dentistry: Novel morphology of the parasitoid wasp mandible. **Robert Kresslein** (rkres001@ucr.edu)¹, Jonah Ulmer² and John M. Heraty¹, ¹Univ. of California, Riverside, CA, ²Pennsylvania State Univ., University Park, PA

10:40 **1173** Correlated evolution of larval color and aggregative behavior in *Neodiprion* sawflies. **John Terbot, II** (jwterb2@uky.edu) and Catherine Linnen, Univ. of Kentucky, Lexington, KY

10:50 **1174** Unravelling the genital evolution of bedbugs using 3D micro-CT imaging. **Ifeoma Ugwuanyi** (i.ugwuanyi@student.unsw.edu.au)¹, Nikolai J. Tatarnic² and Gerry Cassis¹, ¹Univ. of New South Wales, Sydney, NSW, Australia, ²Western Australian Museum, Welshpool, VIC, Australia

11:00 **1175** Back to land: Ecological shifts and morphological adaptations in the water scavenger beetle subfamily Acidocerinae (Coleoptera: Hydrophilidae). **Jennifer C. Girón** (jcgiron@ku.edu) and Andrew Short, The Univ. of Kansas, Lawrence, KS

11:10 **1176** Evolution of specialized structures of the thoracic endoskeleton in the tribe Tachyini (Coleoptera: Carabidae).
Olivia Boyd (boydo@oregonstate.edu), Oregon State Univ., Corvallis, OR

11:20 **1177** Leveraging comparative genomics to study the evolution of maternal care in treehoppers. **Micah Fletcher** (micahf@princeton.edu)¹, Benjamin Rubin¹, Rachel K. Skinner², Christopher H. Dietrich² and Sarah Kocher¹, ¹Princeton Univ., Princeton, NJ, ²Univ. of Illinois, Champaign, IL

11:30 **1178** Presentation withdrawn

11:40 1179 Presentation withdrawn

11:50 **1180** Variations in brain region allocation across a gradient of spider sociality. **Virginia Caponera** (vc389@drexel.edu)¹, Meghan Barrett¹, Cheyenne McNair¹, Leticia Aviles² and Sean O'Donnell¹, ¹Drexel Univ., Philadelphia, PA, ²The Univ. of British Columbia, Vancouver, BC, Canada

Grad 10-min: SysEB, Phylogenetics

Room 124 (America's Center)

Moderator: Stephen Cameron, Purdue Univ., West Lafayette, IN

10:10 **1181** Comparative phylogeography uncovers evolutionary past of circumboreal dragonflies. **Manpreet Kohli** (mkk24@njit.edu)¹, Marie Djernæs², Melissa Sanchez Herrera¹, Erik M. Pilgrim³, Göran Såhlen⁴, Thomas Simonsen⁵ and Jessica Ware¹, ¹Rutgers, The State Univ. of New Jersey, Newark, NJ, ²Aarhus Univ., Aarhus, Denmark, ³US Environmental Protection Agency, Cincinnati, OH, ⁴Halmstad Univ., Halmstad, Sweden, ⁵Natural History Museum, Aarhus, Denmark

Oral Presentations

10:20 **1182** Analyses of shape within a highly variable treehopper lineage (Hemiptera: Membracidae). **Laura Gonzalez** (laura.gonzalez@rutgers.edu)¹, Phillip Barden² and Jessica Ware³, ¹Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, ²American Museum of Natural History, New York, NY, ³Rutgers, The State Univ. of New Jersey, Newark, NJ

10:30 **1183** Auchenorrhynchan (Insecta: Hemiptera) phylogenetics and biogeography: New insights from next-generation sequencing. **Rachel K. Skinner** (rskinn2@illinois.edu)¹, Christopher H. Dietrich¹, Kimberly K. O. Walden¹, Lars Podsiadlowski², Micah Fletcher³, Sarah Kocher³ and Kevin P. Johnson¹, ¹Univ. of Illinois, Champaign, IL, ²Univ. of Bonn, Bonn, Germany, ³Princeton Univ., Princeton, NJ

10:40 **1184** A new phylogeny of Nearctic aphids. **Chloe Kaczvinsky** (cak0052@tigermail.auburn.edu)¹, Robert Footit² and Nate Hardy¹, ¹Auburn Univ., Auburn, AL, ²Agriculture and Agri-Food Canada, Ottawa, ON, Canada

10:50 **1185** Ecological drivers of aphid diversity. **Gwendolyn Bird** (gmb0032@auburn.edu) and Nate Hardy, Auburn Univ., Auburn, AL

11:00 **1186** Phylogenomics and host-switching patterns among major feather louse (Psocodea: Phthiraptera: Philopteridae) groups. **Robert de Moya** (rdemoya2@illinois.edu)¹, Andrew Sweet², Julie Allen¹ and Kevin P. Johnson¹, ¹Univ. of Illinois, Champaign, IL, ²Purdue Univ., West Lafayette, IN

11:10 **1187** The genomic phylogeny of thrips (Insecta: Thysanoptera) based on 2084 molecular loci. **David Stanford-Beale** (dstanfo@purdue.edu)¹, Laurence Mound², Kevin P. Johnson³ and Stephen Cameron¹, ¹Purdue Univ., West Lafayette, IN, ²CSIRO, Canberra, ACT, Australia, ³Univ. of Illinois, Champaign, IL

11:20 **1188** Using phylogenetics to understand the evolution of wing patterns in mimetic tiger moths (Lepidoptera: Erebidae). **Melissa Sisson** (melissa.sisson@und.edu) and Rebecca B. Simmons, Univ. of North Dakota, Grand Forks, ND

11:30 **1189** Molecular phylogeny of the North American Plecoptera. **Eric J. South** (esouth@joimail.com)¹, R. Edward DeWalt¹, Boris C. Kondratieff², Rachel K. Skinner¹, Kevin P. Johnson¹, Mark A. Davis³, Jonathan J. Lee⁴ and Richard S. Durfee⁵, ¹Univ. of Illinois, Champaign, IL, ²C.P. Gillette Museum of Arthropod Diversity, Fort Collins, CO, ³Illinois Natural History Survey, Champaign, IL, ⁴Jon Lee Consulting, Eureka, CA, ⁵Aquatics Environmental Services, Hamilton, MT

Grad 10-min: SysEB, Phylogenetics 3

Room 131 (America's Center)

Moderator: Bryan N. Danforth, Cornell Univ., Ithaca, NY

10:10 **1190** The enigmatic evolution of the spider beetles and related families (Coleoptera: Bostrichoidae). **Olivia Gearner** (olivia.gearner529@topper.wku.edu)^{1,2} and T. Keith Philips¹, ¹Western Kentucky Univ., Bowling Green, KY, ²Purdue Univ., West Lafayette, IN

10:20 **1191** Preliminary phylogenetic analysis of Diaperina. **Amelia Smith** (als852@nau.edu), Northern Arizona Univ., Flagstaff, AZ

10:30 **1192** Improving the targeted capture of Ultraconserved Elements for phylogenetic inference: A case study using the water beetle family Noteridae (Coleoptera). **Stephen Bacá** (s953b810@ku.edu), Grey Gustafson and Andrew Short, The Univ. of Kansas, Lawrence, KS

10:40 **1193** Diversification in the Mesoamerican sky-islands: Molecular phylogenetics and evolution of the New World bess beetles (Coleoptera: Passalidae: Proculini). **Cristian Beza-Beza** (cfbeza@memphis.edu)¹, Duane McKenna¹ and Larry Jiménez-Ferbans², ¹Univ. of Memphis, Memphis, TN, ²Univ. de Magdalena, Santa Marta, Colombia

10:50 **1194** Rapid diversification of the *Nebria ingens* complex in alpine habitats of the Sierra Nevada. **Yi-Ming Weng** (weng22@wisc.edu)¹, David H. Kavanaugh² and Sean Schoville¹, ¹Univ. of Wisconsin, Madison, WI, ²California Academy of Sciences, San Francisco, CA

11:00 **1195** Determinants of genetic differentiation in the sky island pine sawyer, *Monochamus clamator*. **Patrick Gorring** (psg7@cornell.edu)^{1,2} and Brian Farrell¹, ¹Harvard Univ., Cambridge, MA, ²Michigan State Univ., East Lansing, MI

11:10 **1196** Phylogenetic insight into an international pest of mystery: The Colorado potato beetle, *L. decemlineata*. **Zachary Cohen** (zcohen3@wisc.edu)¹, Yolanda Chen² and Sean Schoville¹, ¹Univ. of Wisconsin, Madison, WI, ²Univ. of Vermont, Burlington, VT

11:20 **1197** Study of genome size in the beetle genus *Diabrotica*. **Dimpal Lata** (dlatra@hawk.iit.edu) and Nicholas Miller, Illinois Institute of Technology, Chicago, IL

11:30 **1198** Molecular phylogeny of *Rosalia longicornis* beetles (Coleoptera: Cerambycidae: Cerambycinae). **Seunghyun Lee** (chiyark@snu.ac.kr)¹, Tackgeun You² and Seunghwan Lee¹, ¹Seoul National Univ., Seoul, South Korea, ²Pohang Univ. of Science and Technology, Pohang, South Korea

Grad 10-min: SysEB, Symbionts

Room 125 (America's Center)

Moderator: Aaron Smith, Purdue Univ., West Lafayette, IN

10:10 **1199** Gut bacterial symbionts of turtle ants (*Cephalotes* spp.) encode a diverse suite of digestive enzymes in both larvae and adults. **Benoit Bechade** (bb834@drexel.edu)¹, Yi Hu^{1,2}, Catherine D'Amelio³, John Wertz⁴ and Jacob Russell^{1,1}, ¹Drexel Univ., Philadelphia, PA, ²Beijing Normal Univ., Beijing, PA, China, ³Univ. of Alaska, Anchorage, AK, ⁴Calvin College, Grand Rapids, MI

10:20 **1200** Wolbachia strain diversity and cytoplasmic incompatibility in western (*Rhagoletis indifferens*) and eastern cherry fruit flies (*Rhagoletis cingulata*). **Daniel Bruzzese** (dbruzzes@nd.edu)¹, Hannes Schuler² and Jeffrey Feder¹, ¹Univ. of Notre Dame, South Bend, IN, ²Free Univ., Bozen-Bolzano, Italy

10:30 **1201** The role of host phylogeny in shaping the diversity of bee fly (Bombyliidae) microbiomes. **Allan Cabrero** (acabrero67@gmail.com)¹, Patrick M. O'Grady², Kipling Will¹ and Aman Gill¹, ¹Univ. of California, Berkeley, CA, ²Cornell Univ., Ithaca, NY

10:40 **1202** Strain variation shapes endosymbiont community structure and, possibly, transmission rates in the pea aphid. **Linyao Peng** (lp595@drexel.edu)¹, Danielle Rock¹, Jonah Joffe¹, Andrew H. Smith², Kerry M. Oliver³ and Jacob Russell¹, ¹Drexel Univ., Philadelphia, PA, ²Rodale Institute, Kutztown, PA, ³Univ. of Georgia, Athens, GA

10:50 **1203** Presentation withdrawn

11:00 **1204** Transgenerational transmission of bacterial symbionts in the desert locust. **Omer Levy** (omer.lavy@gmail.com)¹, Amir Ayali¹, Eran Gefen² and Uri Gophna¹, ¹Tel Aviv Univ., Tel Aviv, Israel, ²Univ. of Haifa-Oranim, Kiryat Tivon, Israel

Oral Presentations

Undergrad 10-min: P-IE

Room 240 (America's Center)

Moderators: Morgan Dunn¹ and Bonnie Ohler², ¹Utah State Univ., Logan, UT, ²Univ. of Wisconsin, Madison, WI

10:10 **1227** Comparative efficacy of *Bacillus thuringiensis* var. *israelensis* and entomopathogenic nematodes for controlling fungus gnats (Diptera: Sciaridae) infesting oyster mushrooms.

Valerie Anderson (valeriema2101@gmail.com)¹, Christopher Ranger² and Luis Canas¹, ¹The Ohio State Univ., Wooster, OH, ²USDA - ARS, Wooster, OH

10:20 **1228** Redistribution of *Trissolcus japonicus* and native parasitoid activity associated with the brown marmorated stink bug in Maryland. **Madeline Potter** (mp2293@gmail.com), Rebecca A. Waterworth and Paula M. Shrewsbury, Univ. of Maryland, College Park, MD

10:30 **1229** To catch a killer: Developing PCR primers to assess parasitism rates of parasitoids of the Roseau cane scale.

Keyla Pruitt (kpruett@agcenter.lsu.edu), Ian Knight, Nathan Lord

and Rodrigo Diaz, Louisiana State Univ., Baton Rouge, LA

10:40 **1230** The effects of landscape complexity and local management on a generalist predator in Kenyan maize push-pull systems. **Annika Salzberg** (as3565@cornell.edu)¹, Tim Luttermoser¹, André Kessler¹, Charles Midega², Zeyaur Khan² and Katja Poveda¹, ¹Cornell Univ., Ithaca, NY, ²International Centre of Insect Physiology and Ecology (icipe), Nairobi, Kenya

10:50 **1231** Community structure and habitat preferences in bark lice. **Gloria Luna** (gsl716@lindenwood.edu), Juliette Marini and Scott M. Shreve, Lindenwood Univ., Belleville, IL

11:00 **1232** The distribution and abundance of army cutworm moths (Lepidoptera: Noctuidae) on mountain peaks in the greater Yellowstone ecosystem. **Clare Dittmore** (clare.dittmore@icloud.com)^{1,2}, Robert Peterson¹, Daniel Tyers² and Erika Nunlist¹, ¹Montana State Univ., Bozeman, MT, ²USDA - Forest Service, Bozeman, MT

11:10 **1233** They protec, they attac, on invasive plants they snag: Colonization of invasive Amur honeysuckle (*Lonicera maackii*) by native caterpillar communities. **Sarah Workman** (workman.32@wright.edu), Wright State Univ., Dayton, OH

11:20 **1234** Parasitism and ovary development of *Nezara viridula* on organic sorghum and tomato. **Kylie Lennon** (kylie.lennon@ufl.edu)¹, Norman Leppla¹, Alexander Gannon¹, Amanda Hodges¹ and Robert Hochmuth², ¹Univ. of Florida, Gainesville, FL, ²Univ. of Florida, Live Oak, FL

11:30 **1235** Are flies 'pollen' their weight? Data mining social media for information on fly (Diptera) pollinators. Bekka Brodie, Ayden Wilson and **Evelyn Blakeman** (eb966817@ohio.edu), Ohio Univ., Athens, OH

11:40 **1236** Agricultural land cover, floral resource availability, and pesticide application impact bee body size. **Arabelle Osicky** (aco48@cornell.edu), Cornell Univ., Ithaca, NY

11:50 **1237** Effects of fungal endophyte treatment and herbivory on extra floral nectar carbohydrate composition in cotton. **Caroline Wilson** (cwilson16@tamu.edu)¹, Cody Gale¹, Anjel Helms¹, Charles Suh² and Gregory Sword¹, ¹Texas A&M Univ., College Station, TX, ²USDA - ARS, College Station, TX

Undergrad 10-min: SysEB 2

Room 126 (America's Center)

Moderator: Derek Woller, USDA - APHIS, Phoenix, AZ

10:10 **1238** Survey of ant genera and biodiversity in Toco, Trinidad. **Franchesca Rodriguez** (d4sh1ngdr4gonfly@gmail.com), Texas A&M Univ., Bellville, TX

10:20 **1239** Leaf litter ant communities of Sabah, Malaysia. **Lilly Germeroth** (lgm9d@mst.edu)¹, Theodore Sunnicht², Kalsum Yusah³ and Robin Verble¹, ¹Missouri Univ. of Science and Technology, Rolla, MO, ²Missouri Univ. of Science and Technology, Newburg, MO, ³Universiti Malaysia, Sabah, Malaysia

10:30 **1240** If you are what you eat...what exactly are nitidulids? **Maiya Hamilton** (maiayaham03@byu.edu), Gareth Powell and Seth M. Bybee, Brigham Young Univ., Provo, UT

10:40 **1241** Helikopter models: Ready for takeoff? **Colin Jensen** (colinriesjensen@gmail.com), Natalie Saxton, Abigail Dean, Gareth Powell and Seth M. Bybee, Brigham Young Univ., Provo, UT

10:50 **1242** Distribution and prey choice of *Microstylum galactodes* Loew and *M. morosum* Loew (Diptera: Asilidae) in eastern New Mexico and West Texas. **Colin McKenzie** (colin.mckenzie@enmu.edu), Eastern New Mexico Univ., Portales, NM

11:00 **1243** Buzzing about Long Island: Surveying bee populations in Suffolk County, NY. **Jenny Gan** (gan@farmingdale.edu), Farmingdale State College, Miller Place, NY

11:10 **1244** Arthropod biodiversity survey of Fern Forest Nature Center, a unique habitat of the greater Everglades ecosystem. **Giovanna Ortiz** (ortig21@mail.broward.edu), David Serrano and Christopher Stauffer, Broward College, Davie, FL

11:20 **1245** Comparison of insect biodiversity between habitats in the Kinnickinnic River watershed. **Kendra Letch** (kendra.letch@my.uwrf.edu), Evelyn Ostrowski, Madison Bush and Kevyn Juneau, Univ. of Wisconsin, River Falls, WI

11:30 **1246** Antimicrobial properties of a multifunctional pheromone in the Argentine ant, *Linepithema humile*. **Ali Setayesh** (ali_setayesh@berkeley.edu), Elizabeth Cash and Neil Tsutsui, Univ. of California, Berkeley, CA

11:40 **1247** Disturbance in the force: Road culverts hinder nutrient breakdown in Oklahoma streams. **Rayne Key** (rayne.key@okstate.edu), Melissa Reed and W. Wyatt Hoback, Oklahoma State Univ., Stillwater, OK

11:50 **1248** Analysis of stimulus in the phase-related behavior of *Schisticercus piceifrons*. **Drew Little** (drewlittle@tamu.edu), Hojun Song and Bert Foquet, Texas A&M Univ., College Station, TX

MONDAY, NOVEMBER 18, 2019 • AFTERNOON

Lunch & Learn: Funding Opportunities at the National Science Foundation

Room 131 (America's Center)

Moderators and Organizers: Daniel Gruner^{1,2}, Katharina Dittmar², Michelle Elekonich² and Cesar Nufio³, ¹Univ. of Maryland, College Park, MD, ²National Science Foundation, Alexandria, VA, ³National Science Foundation, Arlington, VA

12:15 PM - 1:15 PM

Oral Presentations

Lunch & Learn: Navigating Cultural Diversity in Scientific Research, Education, and Leadership

Room 130 (America's Center)

Moderators and Organizers: Harit K. Bal^{1,2}, Vivek Kumar³, Swapna Rajarapu⁴, Nandi Nagaraj⁵, Smitha George⁶, Garima Kakkar⁷, Ameya Gondhalekar⁸, Surendra K. Dara⁹, Subba Reddy Palli¹⁰, Luis Canas⁴, Arianne Cease¹⁰, Peter Asiamwe¹ and Linda Mason⁸, ¹Bayer Crop Science, Chesterfield, MO, ²Association of Indian Entomologists in North America, Chesterfield, MO, ³Univ. of Florida, Apopka, FL, ⁴The Ohio State Univ., Wooster, OH, ⁵Corteva Agriscience, Indianapolis, IN, ⁶Univ. of Kentucky, Lexington, KY, ⁷Univ. of Florida, Fort Pierce, FL, ⁸Purdue Univ., West Lafayette, IN, ⁹Univ. of California Cooperative Extension, San Luis Obispo, CA, ¹⁰Arizona State Univ., Tempe, AZ

12:15 PM - 1:15 PM

Antlion Pit Presentation Session

America's Ballroom (America's Center) • 1:00 PM - 3:00 PM

Moderator: Marianne Alleyne, Univ. of Illinois, Champaign, IL



Don't miss out on the inaugural Antlion Pit Competition! It is going to be a thrilling and lively session where six finalists will compete for \$10,000 in prize money. Come and be a part of the excitement to see who survives the Antlion Pit!

Below is list of the finalist that will be presenting:

Biocontrol-agent Transportation System (BTS). **Yong-Lak Park** (yopark@mail.wvu.edu) and Srikanth Gururajan, West Virginia Univ.

Butterfly World 1.0. **Jaeson Clayborn** (jclay010@fiu.edu) and Alban Delamarre, Florida International Univ.

LeafByte. **Zoe Getman-Pickering** (zg94@cornell.edu)¹, Adam Campbell², and Julie Davis¹, ¹Cornell Univ. ²The Blue Folder Project

Matson Trap. **Tanner Matson** (tannermatson@yahoo.com)¹ and Steve Herrick², ¹Univ. of Connecticut, ²Three Rivers CC

SciBugs Tours. **Nancy Miorelli** (miorelln@gmail.com), SciBugs

The Ant Network. **Miles Maxcer** (milesjmax@gmail.com) and Ben Schwartz, Montana State Univ.

Organized Meeting: Highlights of Medical, Urban, and Veterinary Entomology & MUVE Business Meeting

Room 263/264 (America's Center)

Moderator and Organizer: Changlu Wang, Rutgers, The State Univ. of New Jersey, New Brunswick, NJ

- 2:30 Introductory remarks
- 2:35 **1249** Highlights in medical entomology. **Ryan Smith** (smithr@iastate.edu), Iowa State Univ., Ames, IA
- 3:10 **1250** Highlights in urban entomology. **Jennifer Gordon** (jgord13@gmail.com), Douglas Products, San Francisco, CA
- 3:45 **1251** Highlights in veterinary entomology. **Jimmy Pitzer** (jimmy.pitzerjr@csus.edu), California State Univ., Sacramento, CA
- 4:20 Break
- 4:50 MUVE awards presentation
- 5:00 Preliminary business meeting

Organized Meeting: Physiology, Biochemistry, and Toxicology (PBT) Section Meeting Networking Session

Room 260 (America's Center)

Moderators and Organizers: David O'Brochta¹ and Kun Yan Zhu², ¹Foundation for the National Institutes of Health, North Bethesda, MD, ²Kansas State Univ., Manhattan, KS

- 2:30 Open and welcome
- 2:35 PBT representatives and volunteer recognition, award winners
- 2:40 PBT Section initiatives
- 3:00 Solicit nominations for open positions or initiative volunteers
- 3:05 **1252** PBT Recognition Award in Insect Physiology, Biochemistry, and Toxicology winner presentation. **Consuelo De Moraes** (consuelo.demoraes@usys.ethz.ch), ETH Zurich, Zurich, Switzerland
- 3:30 Governing Board Representative report
- 3:35 Treasurer report
- 3:40 Science Policy Fellow report
- 3:45 PBT social hour
- 4:15 Speed networking session

Organized Meeting: Plant-Insect Ecosystem (P-IE) Section Networking, Business, and Learning Session (All Welcome)

Room 230/231 (America's Center)

Moderator and Organizer: Diane G. Alston, Utah State Univ., Logan, UT

- 2:30 Welcome and business meeting
- 2:50 Address by ESA President Bob Peterson
- 3:05 Award presentations and service recognition

Presentations: Poster/Infographic Displays

3:30 **1253** 2019 Science Policy Field Tour highlights: Pest resistance management. **Clint Pilcher** (clint.pilcher@corteva.com), Corteva Agriscience, Johnston, IA

3:50 P-IE Pollinator Committee report and video contest winners

4:15 Raffle drawing

4:25 Introduction to speed-networking and hot topics

4:30 Speed-networking, hot topics, and refreshments

Organized Meeting: Systematics, Evolution, and Biodiversity (SysEB) Section Business Meeting

Room 120/121/122 (America's Center)

Moderators and Organizers: Floyd Shockley¹, Jennifer M. Zaspel², Aaron Smith³, Andrew Short⁴ and Rebecca B. Simmons⁵, ¹Smithsonian Institution, National Museum of Natural History, Washington, DC, ²Milwaukee Public Museum, Milwaukee, WI, ³Northern Arizona Univ., Flagstaff, AZ, ⁴The Univ. of Kansas, Lawrence, KS, ⁵Univ. of North Dakota, Grand Forks, ND

2:30 Welcome reception

3:15 Introductory remarks

3:20 Awards

3:40 **1254** Snodgrass Memorial Research Award winner presentation: Unraveling the evolution of spider flies (Diptera, Acroceridae): Progress and possibilities. **Jessica Gillung** (jpgillung@ucdavis.edu), Cornell Univ., Ithaca, NY

3:55 **1255** Snodgrass Memorial Research Award winner presentation: Phylogenetic systematics and evolution of the Gaudy grasshopper family Pyrgomorphidae (Insecta: Orthoptera). **Ricardo Mariño-Pérez** (pselliopus@yahoo.com.mx), Univ. of Michigan, Ann Arbor, MI

4:10 Break

4:15 NSF report

4:40 Committee reports

4:50 Discussion and forum on Section business

TUESDAY, NOVEMBER 19, 2019

Infographic: All Sections 1

Exhibit Hall 1 & 2 (America's Center)

D3301 Timeline for soybean gall midge in North America. **Erin Hodgson** (ewh@iastate.edu), Iowa State Univ., Ames, IA

D3302 Behavioral response of the western flower thrips to cultivars of alstroemeria in greenhouse crops. **Luis Cubillos-Quijano** (u7500113@unimilitar.edu.co), Daniel Rodriguez and Marco Díaz, Univ. Militar Nueva Granada, Cajicá, Colombia

D3303 Exploring optimal microsprayer placement in a solid set canopy delivery system for high density apples. **Benjamin Savage** (savagebe@msu.edu), Keith Koontz and Matthew Grieshop, Michigan State Univ., East Lansing, MI

D3304 The Mississippi State University Regional Screening Center. **Jennifer Seltzer** (js30@entomology.msstate.edu)¹, Richard Brown² and JoVonn Hill¹, ¹Mississippi State Univ., Mississippi State, MS, ²Mississippi Entomological Museum, Mississippi State, MS

D3305 Hemp, bugs, and attitudes: Advocate entomology to enhance hemp awareness. **Jerome Grant** (jgrant@utk.edu)¹ and Frank Hale², ¹Univ. of Tennessee, Knoxville, TN, ²Univ. of Tennessee, Nashville, TN

D3306 What happens in forests when nobody's present? A sustainable method to document insect behaviors and interactions. **Jaeson Clayborn** (jclay010@fiu.edu), Florida International Univ., Miami, FL

D3307 Monitoring southwestern corn borer, *Diatraea grandiosella*, populations in Arkansas. **Glenn Studebaker** (gstudebaker@uaex.edu) and Courtney Spinks, Univ. of Arkansas, Keiser, AR

D3308 Reassessing biological control of *Pistia stratiotes*. **Ashley Goode** (ashley.goode@ars.usda.gov), Philip Tipping, F. Dray and Paul Madeira, USDA - ARS, Fort Lauderdale, FL

D3309 How to build a better slug trap. **Amy Raudenbush** (raudenbush.3@osu.edu) and Kelley Tilmon, The Ohio State Univ., Wooster, OH

D3310 Azadirachtin as stand alone and in combination with other chemistries in controlling insects on added value crops. **Manuel Campos** (mcampos@biosafesystems.com), BioSafe Systems, East Hartford, CT

D3311 Ultrasound effects on the adult flour beetle (*Tribolium confusum*) reproductive capabilities. **Francoise Favi** (ffavi@vsu.edu) and Ronald Bowen, Virginia State Univ., Petersburg, VA

D3312 EPA registered pheromones for pest control and monitoring - a significant component in IPM programs. **Marcia Anderson** (anderson.marcia@epa.gov), US Environmental Protection Agency, Arlington, VA

D3313 Cockroaches of California: Pest and non-pest species in the urban setting. **Casey Hubble** (cwhubble@ucanr.edu), Univ. of California Cooperative Extension, Concord, CA

D3314 Damages associated with the Guatemalan potato moth *Tecia solanivora* in potato (*Solanum tuberosum* sp. *andigena* var. *Pastusa Suprema*) in different ecosystems of the municipality of Zipaquirá, Cundinamarca, Colombia. **Luis Cubillos-Quijano** (u7500113@unimilitar.edu.co)¹, Marco Díaz¹ and Natali Bello-Castañeda², ¹Univ. Militar Nueva Granada, Cajicá, Colombia, ²Federación Colombiana de Productores de Papa, Bogotá, Colombia

D3315 Mississippi bug blues - invasive awareness, biodiversity, and conservation. **Jason Sanders** (jsanders@entomology.msstate.edu), Jennifer Seltzer and JoVonn Hill, Mississippi State Univ., Mississippi State, MS

D3316 Engaging minority students in entomology and agriculture via an urban teaching garden and social media. **Michelle Samuel-Foo** (mfoo@alasu.edu), Alabama State Univ., Montgomery, AL

D3317 A survey of emergency department patients' experiences with bed bugs. **Johnathan Sheele** (jsheele@gmail.com)¹, Cameron Crandall², Brandon Chang², Brianna Arko³, Colin Dunn² and Alejandro Negrete², ¹Mayo Clinic, Jacksonville, FL, ²Case Western Reserve Univ., Cleveland, OH, ³Univ. Hospitals Cleveland Medical Center, Cleveland, OH

Tuesday, November 19

Presentations: Poster/Infographic Displays

Poster: MUVE 1

Exhibit Hall 1 & 2 (America's Center)

D3318 Physiological effects of different blood sources in maintaining a laboratory colony of hematophagous arthropods (mosquito and hard tick). **Donghun Kim** (dklome2018@gmail.com) and Young Ho Kim, Kyungpook National Univ., Sangju, South Korea

D3319 Presentation withdrawn

D3320 Presentation withdrawn

D3321 Carabid size and wing type in mowed urban spaces. **Michael Roberts** (mrober21@uic.edu)¹ and John Anglin², ¹Univ. of Illinois, Chicago, IL, ²Field Museum of Natural History, Chicago, IL

D3322 The fine structure of the tibial spur of the red imported fire ant, *Solenopsis invicta* Buren (Hymenoptera: Formicidae). **Michael Grodowitz** (michael.grodowitz@ars.usda.gov), Richard Evans and Jian Chen, USDA - ARS, Stoneville, MS

D3323 Influence of subterranean termites (Rhinotermitidae: *Reticulitermes flavipes* (Kollar)) on chemical and microbial soil properties. **Rachel Arango** (rarango@fs.fed.us)¹, Megan Grejczyk² and Camila Carlos-Shanley³, ¹USDA - Forest Service, Madison, WI, ²Univ. of Wisconsin, Madison, WI, ³Texas State Univ., San Marcos, TX

D3324 The effect of blending *Gonimbrasia belina* (Lepidoptera: Saturniidae) larvae and maize flours on instant porridge product amino acid composition. **Matome Moleha** (maboko.mphosi@gmail.com)¹ and Maboko Mphosi², ¹Univ. of Limpopo, Sovenga, South Africa, ²Univ. of Limpopo, Polokwane, South Africa

D3325 Optimizing the loading level of boric acid in a granular bait: A comparative study. **Reid Ipser** (reidi@nisuscorp.com), Nisus Corporation, Rockford, TN

D3326 Human antibody response from being fed upon by bed bugs. **Johnathan Sheele** (jsheele@gmail.com)¹, Brian Ferrari², Jerome Goddard³, Andrew Young², Gale E. Ridge⁴, Katirina Coppolino⁵ and Thomas McCormick², ¹Mayo Clinic, Jacksonville, FL, ²Case Western Reserve Univ., Cleveland, OH, ³Mississippi State Univ., Mississippi State, MS, ⁴Connecticut Agricultural Experiment Station, New Haven, CT, ⁵The Ohio State Univ., Columbus, OH

D3327 Aversion of the invasive Asian longhorned tick to a small mammalian host, the white-footed mouse. **Isobel Ronai** (ir2392@columbia.edu), Danielle Tufts and Maria Diuk-Wasser, Columbia Univ., New York, NY

D3328 *Aedes aegypti* in the northern Saharan zone of Mauritania. **Mohamed Salem Ahmedou Salem** (salem0606@yahoo.fr)¹, Ousmane Ndiaye¹, Mohamed Aly Ould Lemrabott¹, Khadijetou Mint Lekweiry^{1,2}, Ousmane Faye³, Leonardo Basco⁴ and Ali Ould Mohamed Salem Boukhary¹, ¹Univ. de Nouakchott Al-Aasriya, Nouakchott, Mauritania, ²Institut Supérieur d'Enseignement Technologique de Rosso, Rosso, Mauritania, ³Université Cheikh Anta Diop, Dakar, Senegal, ⁴Institut de recherche pour le développement, Marseille, France

D3329 Effect of larval rearing habitat on adult microbiota and immune status in the mosquito vector *Aedes albopictus*. **Aline Badial** (ar2563@msstate.edu), Amelia Kundel and Jonas G. King, Mississippi State Univ., Mississippi State, MS

D3330 Approaches to the control of housefly, *Musca domestica*, using entomopathogenic fungi. **Blanca Cardiel-Hernandez** (neosportita12@gmail.com) and Sergio Sanchez- Peña, Univ. Autónoma Agraria Antonio Narro, Saltillo, CU, Mexico

D3331 Zoonotic and infectious disease vector-borne pathogen surveillance in multiple canine populations from varying regions of South America - enhancing public health by applying the one health concept. **Michael McCown** (michael.e.mccown.mil@mail.mil), US Army, DPO, Georgia

D3332 Update on tick-borne pathogens in Illinois. **Holly C. Tuten** (htuten@illinois.edu)¹, Erica Hernandez², Kylee Noel², Chang-Hyun Kim¹ and Chris Stone¹, ¹Illinois Natural History Survey, Champaign, IL, ²Univ. of Illinois, Champaign, IL

D3333 *Rickettsia* spp. in five tick species collected in central California. **Cameron Osborne** (cjosborne@ksu.edu)^{1,2}, Alya Wakeman-Hill¹, Steven Loa¹, Paul Crosbie¹ and Tricia Van Laar¹, ¹California State Univ., Fresno, CA, ²Kansas State Univ., Manhattan, KS

D3334 Identifying diagnostic criteria for resistance to bifenthrin in *Culex pipiens pipiens* (Diptera: Culicidae). **Megan Greenwood** (megan.greenwood@maine.edu)¹, Margaret Welch¹, Molly Meagher², Joseph Staples², Charles Lubelczyk³ and Rebecca Robich³, ¹Univ. of Southern Maine, Portland, ME, ²Univ. of Southern Maine, Gorham, ME, ³Maine Medical Center Research Institute, Scarborough, ME

D3335 Comprehensive management protocol for spotted lanternfly in the ornamental landscape setting. **Erik Lindberg** (elindberg@treecarescience.com) and David Anderson, Rainbow Treecare Scientific Advancements, Minnetonka, MN

D3336 Presentation withdrawn

D3337 Presentation withdrawn

Poster: PBT 1

Exhibit Hall 1 & 2 (America's Center)

D3338 Chemical and visual ecology of the coconut rhinoceros beetle, *Oryctes rhinoceros* (L.). **Damon Crook** (damon.j.crook@aphis.usda.gov)¹, Allard Cossé¹, Michael Melzer², Daniel Jenkins², Roland Quitugua³, Matthew Siderhurst⁴ and Darcy Oishi⁵, ¹USDA - APHIS, Buzzards Bay, MA, ²Univ. of Hawai'i, Honolulu, HI, ³Univ. of Guam, Mangilao, Guam, ⁴Eastern Mennonite Univ., Harrisonburg, VA, ⁵Hawai'i Division of Plant Industry, Honolulu, HI

D3339 Improvements on methodology for tier I toxicity testing on non-target beneficial insects using microbial pesticides (EPA OPPTS 885.4340). **Ming Hua Huang** (minghuahuang@eurofins.com) and Amanda Martin, Eurofins Agroscience Services LLC, Prospect Hill, NC

D3340 Fitness cost of Cry34/35Ab1 resistance in western corn rootworm. **Adriano Pereira** (pereiraa@missouri.edu)¹, Kyle Paddock¹, Julie Barry² and Bruce Hibbard², ¹Univ. of Missouri, Columbia, MO, ²USDA - ARS, Columbia, MO

D3341 Simple as ABC: Using transcriptomics to identify RNAi targets in the corn planthopper, *Peregrinus maidis*. **Yu-Hui Wang** (ywang259@ncsu.edu)¹, Racheal Fairley², William Klobasa¹, Nathaniel Grubbs¹ and Marcé Lorenzen¹, ¹North Carolina State Univ., Raleigh, NC, ²Univ. of Alabama, Birmingham, AL

D3342 Identification of promoters from fall armyworm, *Spodoptera frugiperda*. **Xien Chen** (xe.chen@uky.edu), Shankar Chereddy, Dhandapani Gurusamy and Subba Reddy Palli, Univ. of Kentucky, Lexington, KY

D3343 Task sequences in honey bee nurses. **Sonnie Sheahan** (sheahans4@students.rowan.edu)¹, Daniel Charbonneau², Olivia Smithson¹, Mathew Smithson¹, Simona Smithson¹, Tyrell Harris¹, Kimberly Ojeda-Celaya¹, Timothy A. Linksvayer³ and Svetlana Vojvodic¹, ¹Rowan Univ., Glassboro, NJ, ²Univ. of Arizona, Tucson, AZ, ³Univ. of Pennsylvania, Philadelphia, PA

Presentations: Poster/Infographic Displays

D3344 Multidimensional approach to developing an accessible diet for western corn rootworm (Coleoptera: Chrysomelidae) larvae. **Man Huynh** (mphpd32@mail.missouri.edu)¹, Bruce Hibbard², Mike Vella³, Stephen L. Lapointe⁴, Randall P. Niedz⁵, Kent S. Shelby² and Thomas Coudron², ¹Univ. of Missouri, Columbia, MO, ²USDA - ARS, Columbia, MO, ³Frontier Agricultural Services, Newark, DE, ⁴USDA - ARS (retired), Fort Pierce, FL, ⁵USDA - ARS, Fort Pierce, FL

D3345 Sociality affects bee sensitivity to imidacloprid insecticide. **Blair Sampson** (blair.sampson@ars.usda.gov)¹, Ales Gregorc², John Adamczyk¹, Chris Werle¹, Mohamed Alburaki³ and Shahid Karim³, ¹USDA - ARS, Poplarville, MS, ²Univ. of Maribor, Maribor, MS, Slovenia, ³The Univ. of Southern Mississippi, Hattiesburg, MS

D3346 Growth curve for soldier fly larvae under constant temperature. **Andrei Alyokhin** (alyokhin@maine.edu) and Joshua Villazana, Univ. of Maine, Orono, ME

D3347 Fatty acid profile of house crickets (*Acheta domesticus*) fed with different diet formulations with by-products. **M. Guadalupe Rojas** (guadalupe.rojas@ars.usda.gov) and Juan Morales-Ramos, USDA - ARS, Stoneville, MS

D3348 Comprehensive transcriptome analysis of metamorphosis from egg to adult in *Bactrocera dorsalis*. **Shi-Huo Liu** (liushihuo@email.swu.edu.cn), Qiang Zhang, Wei Li, Run-Yan Li, Ying-Dan Xia, Yi Liu, Er-Hu Chen, Wei Dou and Jin-Jun Wang, Southwest Univ., Chongqing, China

D3349 CRISPR/Cas9-mediated knockout of the *abdominal-A* homeotic gene in fall armyworm moth (*Spodoptera frugiperda*). **Ke Wu** (kewu@ufl.edu)¹, Paul Shirk², Caitlin Taylor¹, Richard B. Furlong², Bryce Shirk², Daniele Pinheiro¹ and Blair Siegfried¹, ¹Univ. of Florida, Gainesville, FL, ²USDA - ARS, Gainesville, FL

D3350 Physiological functions of a methuselah-like G protein coupled receptor in *Lymantria dispar*. **Timothy Moural** (twm78@psu.edu)¹, Lili Sun², Hui Du², Peng Liu², Hua Bai³, Chuanwang Cao² and Fang Zhu¹, ¹Pennsylvania State Univ., University Park, PA, ²Northeast Forestry Univ., Haibin, China, ³Iowa State Univ., Ames, IA

D3351 Toxicological and behavioral analysis of methyl benzoate and derivatives to the common bed bug, *Cimex lectularius* (L.). **Nicholas Larson** (nicholas.larson@ars.usda.gov), Jaime Strickland, Mark Feldlaufer and Aijun Zhang, USDA - ARS, Beltsville, MD

D3352 Comparative CYPomic analysis between the DDT susceptible and resistant *Drosophila melanogaster* strains 91-C and 91-R. **Keon Mook Seong** (seongkeo@msu.edu)¹, Brad Coates², May Berenbaum³, John Clark⁴ and Barry R. Pittendrigh¹, ¹Michigan State Univ., East Lansing, MI, ²USDA - ARS, Ames, IA, ³Univ. of Illinois, Champaign, IL, ⁴Univ. of Massachusetts, Amherst, MA

D3353 Oral delivery of double-stranded RNA to females of coffee berry borer, *Hypothenemus hampei* (Coleoptera: Curculionidae: Scolytinae) induces RNAi response. Paula Arias, Gustavo Ossa, **Bernardo Villegas** (bernardo.villegas@ucaldas.edu.co) and Arnubio Valencia, Univ. de Caldas, Manizales, Colombia

D3354 Efficacy of *Trichoderma* sp. and *Bacillus thuringiensis* integration for management of insect pests of brinjal (*Solanum melongena* L.). **Ahmad Nawaz** (nawazrajpoot@yahoo.com)¹, Muhammad Sufyan¹, Muhammad Dildar Gogi¹, Muhammad Naveed¹, Muhammad Bilal Ayyub^{1,2}, Hina Kiran¹, Umar Aslam¹, Muhammad Waseem¹ and Ume Farwa Akhtar¹, ¹Univ. of Agriculture, Faisalabad, Pakistan, ²Purdue Univ., West Lafayette, IN

D3355 Efficacy of reduced risk, microbial and conventional agents for suppression and control of the pepper weevil, *Anthonomus eugenii*. **Roselyne Labbe** (roselyne.labbe@canada.ca)¹, Dana Gagnier¹, Rebecca Rizzato¹, Amanda Tracey² and Cara M. McCreary³, ¹Agriculture and Agri-Food Canada, Harrow, ON, Canada, ²Ontario Ministry of Agriculture, Food and Rural Affairs, Ridgetown, ON, Canada, ³Ontario Ministry of Agriculture, Food and Rural Affairs, Harrow, ON, Canada

D3356 Characterization of Seipin and Neuropeptide F genes in *Leptinotarsa decemlineata*. **Cansu Doğan** (7cansudogan@gmail.com)¹, Sabine Hänniger², David Heckel², Dwayne Hegedus³, Serife Bayram¹ and Umut Toprak¹, ¹Ankara Univ., Ankara, Turkey, ²Max Planck Institute for Chemical Ecology, Jena, Germany, ³Agriculture and Agri-Food Canada, Saskatoon, SK, Canada

D3357 Molecular and functional analyses of cytochrome P450 4G subfamily genes in *Tribolium castaneum*. **Zhitao Yu** (zhitao@ksu.edu)¹, Fei Hu¹, Haoliang Chen², Kristopher Silver¹, James Campbell³, Frank Arthur³ and Kun Yan Zhu¹, ¹Kansas State Univ., Manhattan, KS, ²Anhui Academy of Agricultural Sciences, Hefei, China, ³USDA - ARS, Manhattan, KS

D3358 Mosquito repellents induce inhibitory (outward) currents on receptors tuned to an oviposition attractant. **Pingxi Xu** (pxxu@ucdavis.edu)¹, Fangfang Zeng¹, Robert Bedoukian² and Walter Leal¹, ¹Univ. of California, Davis, CA, ²Bedoukian Research, Inc, Danbury, CT

D3359 Global analysis of small RNA populations across tissues in the mosquito, *Anopheles gambiae*. **William Bryant** (williamb@usca.edu) and Mary Mills, Univ. of South Carolina, Aiken, SC

D3360 Bacteria: A novel source for potent mosquito feeding-deterrents. **Mayur Kajla** (kajla@uwalumni.com), Gregory Barrett-Wilt and Susan Paskewitz, Univ. of Wisconsin, Madison, WI

Poster: P-IE 1

Exhibit Hall 1 & 2 (America's Center)

D3361 Can *Darapsa myron* (Lepidoptera: Sphingidae) successfully use the invasive *Ampelopsis brevipedunculata* as a food resource? **Alex Baranowski** (alexbaran74@uri.edu) and Evan L. Preisser, Univ. of Rhode Island, Kingston, RI

D3362 Increasing temperature leads to increased preference of darkling beetles *Akis subtricostata* and *Trachyderma philistina* for vegetation. **Aaron Bartholomew** (abartholomew@aus.edu) and Omar Ismail, American Univ. of Sharjah, Sharjah, United Arab Emirates

D3363 Ohio Youth Institute students experience edible insects. **James Jasinski** (jasinski.4@osu.edu)¹, Annie Specht² and Danae Wolfe², ¹The Ohio State Univ., Urbana, OH, ²The Ohio State Univ., Columbus, OH

D3364 The behavioral responses of *Rhyzopertha dominica* (Coleoptera: Bostrichidae) and *Tribolium castaneum* (Coleoptera: Tenebrionidae) to individual fungal volatiles in a wind tunnel and release-recapture experiment. **Alexander Bruce** (alexander.bruce@ars.usda.gov)¹, Hannah Quellhorst², Rachel Wilkins², Taylor Van Winkle³, Marco Ponce³ and William Morrison¹, ¹USDA - ARS, Manhattan, KS, ²Kansas State Univ., Manhattan, KS, ³Kalamazoo College, Kalamazoo, MI

D3365 The southernmost occurrence of mopane worm (*Gonimbrasia belina*) in Africa. **Godfrey Zharare** (zharareg@unizulu.ac.za)¹, Makholisi Buthelezi² and Brian Fakazi¹, ¹Univ. of Zululand, Kwadlangezwa, South Africa, ²Mangosuthu Univ. of Technology, Durban, South Africa

Tuesday, November 19

Presentations: Poster/Infographic Displays

D3394 Microbial communities in host soil and the alimentary tract of Japanese beetle, *Popillia japonica* Newman. **Helena Avila-Arias** (favailar@purdue.edu), Michael Scharf, Ronald Turco and Douglas Richmond, Purdue Univ., West Lafayette, IN

D3395 Gene expression is dynamically altered in *Helicoverpa zea* caterpillars to plant tissues. **Richard Musser** (ro-musser@wiu.edu), Western Illinois Univ., Macomb, IL

D3396 Monarch butterfly landscape ecology: The effects of milkweed patch size and surrounding landscape on monarch abundance. **Anna Skye Harnsberger** (skye.harnsberger@wisc.edu), Univ. of Wisconsin, Madison, WI

D3397 Can *Aleurotrachelus trachoides* back acquire and transmit tomato yellow leaf curl virus? **Cindy McKenzie** (cindy.mckenzie@ars.usda.gov)¹, Lance Osborne² and Jane Polston³, ¹USDA - ARS, Fort Pierce, FL, ²Univ. of Florida, Apopka, FL, ³Univ. of Florida, Gainesville, FL

D3398 Inferences of Psocoptera natural history and phenology from collection data. **Scott M. Shreve** (sshreve@lindenwood.edu), Juliette Marini and Gloria Luna, Lindenwood Univ., Belleville, IL

D3399 Induced defenses increase caterpillar pathology to a fungus. Sue Hum-Musser, **Estelita Allen** (el-allen2@wiu.edu), Rajeev Roy and Richard Musser, Western Illinois Univ., Macomb, IL

D3400 Summer brevity, not winter cold, define upper elevation limits of a solitary bee. **James H. Cane** (jim.cane2@gmail.com)¹ and Byron Love², ¹USDA - ARS (retired), Logan, UT, ²USDA - ARS, Logan, UT

D3401 Characterization of a 'yellow-eye' mutant of bollworm, *Helicoverpa zea* (Boddie). **Bridget Piatt** (bpiatt1@my.westga.edu), Emily Adams and Gregory Payne, Univ. of West Georgia, Carrollton, GA

D3402 Population dynamics of aphid species in Korean seed potato cultivation area over four decades. **Ju Il Kim** (forweek@korea.kr) and Min Kwon, National Institute of Crop Science, Pyeongchang, South Korea

D3403 The impact of symbiosis on a predatory mite as consequence of tritrophic interactions. **Bruna Merlin** (bruna.merlin@usp.br), Fernando Luis Cônsoli and Gilberto de Moraes, Univ. de São Paulo, Piracicaba, Brazil

D3404 An expanding fritness landscape: Minimum temperatures, host plant distribution, and the expansion of the Gulf Fritillary. **Chris Halsch** (cahalsch@nevada.unr.edu)¹, Arthur M. Shapiro² and Matthew Forister¹, ¹Univ. of Nevada, Reno, NV, ²Univ. of California, Davis, CA

D3405 Lessons learned from a multiyear study on *Megachile rotundata* reproduction: All those details matter! **Theresa Pitts-Singer** (theresa.pitts-singer@ars.usda.gov), USDA - ARS, Logan, UT

D3406 External morphology and developmental changes of tarsal tips and mouthparts of the invasive spotted lanternfly, *Lycorma delicatula*. Alina Avanesyan, Timothy Maugel and **William Lamp** (lamp@umd.edu), Univ. of Maryland, College Park, MD

D3407 Effects of extreme winter temperature on survival of overwintering emerald ash borer larvae and associated parasitoids in 2019 in Michigan: Implications for biological control. **Jian Duan** (jian.duan@ars.usda.gov)¹, Leah S. Bauer², Jonathan Schmude¹, Toby R. Petrice², Jennifer Chandler³ and Roy Van Driesche³, ¹USDA - ARS, Newark, DE, ²USDA - Forest Service, Lansing, MI, ³Univ. of Massachusetts, Amherst, MA

D3408 Feeding behavior of *Nezara viridula* first instars: EPG analysis and effect of food availability on subsequent development. **Paula Mitchell** (leptoglossus@yahoo.com) and Kelly Rivera, Winthrop Univ., Rock Hill, SC

D3409 Development of pre-harvest field-grown nursery treatment alternatives to chlorpyrifos for the federal imported fire ant quarantine. **Jason Oliver** (joliver@tnstate.edu)¹, Karla Addesso¹, Anthony Witcher¹, Luke Dant², Nadeer Youssef¹, Paul O'Neal¹, Amy Dismukes¹, Ronald D. Weeks³ and Lisa Alexander⁴, ¹Tennessee State Univ., McMinnville, TN, ²Syngenta Crop Protection, Simpsonville, SC, ³USDA - APHIS, Raleigh, NC, ⁴USDA - ARS, McMinnville, TN

D3410 Vector host breadth manipulation by plant viruses. **Sanford Eigenbrode** (sanforde@uidaho.edu)¹, Robert Emerson², David Crowder² and Ying Wu¹, ¹Univ. of Idaho, Moscow, ID, ²Washington State Univ., Pullman, WA

D3411 Bees (Hymenoptera: Apoidea) in flowering soybean and sunflower fields in North Dakota. **Veronica Calles Torrez** (veronica.callesstorre@ndus.edu)¹, Patrick Beauzay¹, Ashley St. Clair² and Janet Knodel¹, ¹North Dakota State Univ., Fargo, ND, ²Iowa State Univ., Ames, IA

D3412 Effect of barley yellow dwarf virus on dispersion of aphids among maize plants. **Yesenia Ithaí Ángeles-López** (yiangele@ncsu.edu), Anders Huseth and Dorith Rotenberg, North Carolina State Univ., Raleigh, NC

D3413 Examining the diet of pest insects collected from potato crops using metabarcoding. **Victoria Skillman** (skillmav@onid.orst.edu), Xiaoping Li and Kenneth E. Frost, Oregon State Univ., Hermiston, OR

D3414 Prey diversity of foraging *Cerceris fumipennis* Say (Hymenoptera: Crabronidae) and factors influencing buprestid diversity and species distributions in Minnesota. **Aubree Kees** (wilke137@umn.edu), Marie Hallinen, Jennifer Schultz, Jacob Wittman and Brian Aukema, Univ. of Minnesota, St. Paul, MN

D3415 Climate change risk analysis of the distribution and growth potential of the banana aphid. **Rachid Hanna** (rachidhanna01@gmail.com)¹, Lava Kumar², Sergine Ngatat³, Michel Ndjab³, Michel Dongmo³, Apolin Fotso Kuate³, Henri Tonnang⁴ and Jurgen Kroschel⁵, ¹Congo Basin Institute, Yaounde, Cameroon, ²International Institute of Tropical Agriculture, Ibadan, Nigeria, ³International Institute of Tropical Agriculture, Yaoundé, Cameroon, ⁴International Institute of Tropical Agriculture, Cotonou, Benin, ⁵International Potato Center, Lima, Peru

D3416 Evaluation of COI metabarcoding primers for arthropod predator diets in agroecosystems. **Hannah Gray** (grayx379@umn.edu)¹, Debora Pires Paula² and David Andow¹, ¹Univ. of Minnesota, St. Paul, MN, ²Embrapa, Brasília, Brazil

D3417 Natural Enemies: ENDGAME for Kudzu Bug, *Megacopta cribraria*. **Jerome Grant** (jgrant@utk.edu)¹ and Amy Michael², ¹Univ. of Tennessee, Knoxville, TN, ²Arkansas Agriculture Dept., Little Rock, AR

D3418 Can we infer *Nosema ceranae* inoculum and inoculation time from honey bee (*Apis mellifera*) midgut histology? **Thomas C. Webster** (thomas.webster@kysu.edu), Katherine Kamminga and Martin Matisoff, Kentucky State Univ., Frankfort, KY

D3419 From the deserts of the Great Basin to the forests of Campinas: How does novel host use influence the insect immune response? **Su'ad Yoon** (suady@nevada.unr.edu)¹, Rodrigo Cogni², Matthew Forister¹ and Angela Smilanich¹, ¹Univ. of Nevada, Reno, NV, ²Univ. de São Paulo, São Paulo, Brazil

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Presentations: Poster/Infographic Displays

D3420 Ontogeny and defensive induction shape the diversity of secondary metabolites within two species of ash (Oleaceae: *Fraxinus* spp.) in New Hampshire. **Todd D. Johnson** (tdjohns2@illinois.edu)¹, Breanne Aflague¹, Juli Gould² and Jeff Garnas¹, ¹Univ. of New Hampshire, Durham, NH, ²USDA - APHIS, Buzzards Bay, MA

D3421 Willingness to pay to support non-honey bee pollinator conservation. **Jerrod Penn** (jpenn@agcenter.lsu.edu)¹, Hannah Penn² and Wuyang Hu³, ¹Louisiana State Univ., Baton Rouge, LA, ²Univ. of Texas, Edinburg, TX, ³The Ohio State Univ., Columbus, OH

D3422 Arthropod monitoring in Southern California riparian areas recovering from invasive *Arundo donax*. **Charlie Braman** (charliebraman@ucsb.edu), Skylar Primavera and Adam Lambert, Univ. of California, Santa Barbara, CA

D3423 Modeling the probability and magnitude of cotton fleahopper infestations in cotton. **Kristin Hamons** (kritee@tamu.edu)¹, Hsiao-Hsuan Wang¹, William Grant¹, Charles Suh² and Gregory Sword¹, ¹Texas A&M Univ., College Station, TX, ²USDA - ARS, College Station, TX

D3424 Foliage consumption and growth of *Spodoptera latifascia* (Lepidoptera: Noctuidae) on different citrus cultivars. **Esmail Saberi** (esaberi@ufl.edu), Mohamed Ali, Fernando Alferez and Jawwad Qureshi, Univ. of Florida, Immokalee, FL

D3425 Trapping and infestation of coffee berry borer and their relationship to weather variables in Hawai'i and Puerto Rico.

Claudia Ruiz-Diaz (claudia.ruiz2@upr.edu)¹, Melissa Johnson², Nicholas Manoukis² and Jose Verle Rodrigues¹, ¹Univ. of Puerto Rico, San Juan, PR, ²USDA - ARS, Hilo, HI

D3426 Insect pests of corn in on-farm grain storage in Arkansas. **Neelendra Joshi** (nkjoshi@uark.edu)¹, Nick Bateman², Gus Lorenz³, Glenn Studebaker⁴, Ben Thrash³, Aaron Cato¹, Olivia Kline¹ and Joseph Belsky¹, ¹Univ. of Arkansas, Fayetteville, AR, ²Univ. of Arkansas, Monticello, AR, ³Univ. of Arkansas, Lonoke, AR, ⁴Univ. of Arkansas, Keiser, AR

D3427 Genetic resistance to wheat curl mites and wheat streak mosaic virus. **Tessa Albrecht** (tessa.albrecht@colostate.edu) and Punya Nachappa, Colorado State Univ., Fort Collins, CO

D3428 Infestation rate by the walnut husk fly *Rhagoletis completa* in wooded and suburban habitats. Juliette Marini¹, Ta'zhae Crowley² and **Scott M. Shreve** (sshreve@lindenwood.edu)¹, ¹Lindenwood Univ., Belleville, IL, ²Lindenwood Univ., St. Charles, MO

D3429 Insects, biosecurity, and international collaboration in Ecuador. **Morgan Pinkerton** (morgan0402@ufl.edu)¹, Sage Thompson¹, Lisbeth Espinoza² and Amanda Hodges¹, ¹Univ. of Florida, Gainesville, FL, ²Escuela Superior Politecnica del Litoral, Guayaquil, Ecuador

D3430 Dung beetle decline in central Florida ranchlands. **Joshua King** (joshua.king@ucf.edu) and Roisin Stanbrook, Univ. of Central Florida, Orlando, FL

D3431 The effects of landscape characteristics on native bee sex ratios. **Matthew Newman** (matnewm@ostatemail.okstate.edu), Sarah Elzay, Julie Angle and Kristen Baum, Oklahoma State Univ., Stillwater, OK

D3432 The effect of climate change on the relationship between agricultural pests and their parasitoids. **Ryan Spahn** (rspahn@gwu.edu) and John Lill, George Washington Univ., Washington, DC

D3433 Erythritol ingestion causes concentration-dependent survival reduction in subterranean termites (*Reticulitermes: flavipides*). **Virginia Caponera** (vc389@drexel.edu), Meghan Barrett, Daniel Marend and Sean O'Donnell, Drexel Univ., Philadelphia, PA

D3434 Integrating chemical ecology and genomics to develop breeding strategies for *Cucurbita pepo* resistance to specialist pest, *Acalymma vittatum*. **Lauren Brzozowski** (ljb279@cornell.edu), Anurag Agrawal and Michael Mazurek, Cornell Univ., Ithaca, NY

D3435 Phenotypic and genomic evaluation of TN1 collected in Taiwan. Yi Li¹, Yung-Fen Huang¹, Yun-Hung Kuang¹, Chih-Wei Tung¹, Chung-Ta Liao² and **Wen-Po Chuang** (wenpo@ntu.edu.tw)¹, ¹National Taiwan Univ., Taipei, Taiwan, ²Taichung District Agricultural Research and Extension Station, Changhua, Taiwan

D3436 Relative susceptibility of Asian and European ash (*Fraxinus* spp.) taxa to the emerald ash borer (*Agrilus planipennis*). **Erin McMahan** (emcmahan@mortonarb.org) and Fredric Miller, The Morton Arboretum, Lisle, IL

D3437 Feeding preference of cotton boll weevils: Bt vs. conventional plants. **Tatianne Abreu-Jardim** (tatibio1@gmail.com)¹, José Miranda¹, Augusto Batista¹, Edson Hirose², Bruna Tripode¹, Nívia Bonavigo¹ and Laís Santos¹, ¹Embrapa Algodão, Santo Antonio de Goiás, Brazil, ²Embrapa Soja, Santo Antonio de Goiás, Brazil

D3438 Genetic mapping of maize resistance to western corn rootworm, *Diabrotica virgifera virgifera* LeConte. **Lisa Meihls** (lhm2m9@mail.missouri.edu)¹, Sherry Flint-Garcia², Matthias Erb³ and Bruce Hibbard², ¹USDA - ARS, St. Louis, MO, ²USDA - ARS, Columbia, MO, ³Univ. of Bern, Bern, Switzerland

D3439 Elite *Glycine soja* accessions with newly identified resistance to soybean aphid. **Louis Hesler** (louis.hesler@usda.gov)¹ and Earl Tallercio², ¹USDA - ARS, Brookings, SD, ²USDA - ARS, Raleigh, NC

D3440 Antibiosis and antixenosis to soybean aphid in soybean plant introductions. **Raman Bansal** (raman.bansal@usda.gov)¹, Rouf Mian² and Andrew Michel³, ¹USDA - ARS, Parlier, CA, ²USDA - ARS, Raleigh, NC, ³The Ohio State Univ., Wooster, OH

D3441 Antibiosis and/or antixenosis of cotton genotypes to *Aphis gossypii* (Hemiptera: Aphididae). **Edson Baldin** (edson.baldin@unesp.br)¹, Rafaela Morando¹ and André Lourenço², ¹Univ. Estadual Paulista, Botucatu, Brazil, ²Instituto Agronômico de Campinas, Campinas, Brazil

D3442 Effects of methyl jasmonate alone and in combination with gibberellic acid on plant growth and resistance in rice, *Oryza sativa* L. **Santhi Bhavanam** (sbhavanam@agcenter.lsu.edu) and Mike Stout, Louisiana State Univ., Baton Rouge, LA

D3443 Presentation withdrawn

D3444 A new Massive Open Online Course (MOOC): Bugs 101, Insect-Human Interactions. **Maya Evenden** (meyenden@ualberta.ca) and Ilan Domnich, Univ. of Alberta, Edmonton, AB, Canada

D3445 Insights about the genetic diversity of phytoplasmas in Florida and Central America in both palm hosts and vectors based on 16S high-throughput sequencing. **Marina Ascunce** (ascunce@ufl.edu)¹, Marie de Gracia Coquerel¹, Lidia Komondy², De-Fen Mou², Alessandra R. Humphries², Noemi Soto², Ericka Helmick², Erica Goss¹, Edwin A. Barrantes Barrantes³, Marco A. Zumbado Echavarria³ and Brian Bahder², ¹Univ. of Florida, Gainesville, FL, ²Univ. of Florida, Davie, FL, ³Univ. de Costa Rica, San Ramón, Costa Rica

D3446 What are Ento-Allies? **Gwen Pearson** (gpearson@purdue.edu)¹, Jessica Ware², Corrie Moreau³, Andrew Suarez⁴, Gail Kampmeier⁵ and Marianne Alleyne⁴, ¹Purdue Univ., West Lafayette, IN, ²Rutgers, The State Univ. of New Jersey, Newark, NJ, ³Cornell Univ., Ithaca, NY, ⁴Univ. of Illinois, Champaign, IL, ⁵Illinois Natural History Survey, Champaign, IL

Presentations: Poster/Infographic Displays

D3447 Developing entomovectoring for the management of anthracnose disease and the oriental fruit fly *Bactrocera dorsalis* on mango. **Ingeborg Menzler-Hokkanen** (ingeborg.menzler-hokkanen@uef.fi), Univ. of Eastern Finland, Kuopio, Finland

D3448 Identity of volatile emissions from, and behavioral response to, moldy wheat by *Rhyzopertha dominica* (Coleoptera: Bostrichidae) and *Tribolium castaneum* (Coleoptera: Tenebrionidae). **Taylor Van Winkle** (taylorvanwinkle21@gmail.com)¹, Marco Ponce² and William Morrison³, ¹Kalamazoo College, Kalamazoo, MI, ²Kansas State Univ., Manhattan, KS, ³USDA - ARS, Manhattan, KS

Poster: SysEB 1

Exhibit Hall 1 & 2 (America's Center)

D3449 Horizontal transfer of a retrotransposon from the rice planthopper to the genome of an insect DNA virus. Qiankun Yang¹, Yan Zhang¹, Ida Andika², Zhenfeng Liao³, Kondo Hideki², Fei Yan¹, Jianping Chen¹ and **Junmin Li** (lijunmin@nbu.edu.cn)¹, Ningbo Univ., Ningbo, China, ²Okayama Univ., Okayama, Japan, ³Zhejiang Academy of Agricultural Sciences, Hangzhou, China

D3450 Six years of fruit fly (Diptera: Tephritidae: Dacinae) surveys and monitoring in Bangladesh. **Luc Leblanc** (leblanc@uidaho.edu)¹, M. Aftab Hossain², Mahfuza Momen², M. Abdul Bari², Shakil Ahmed Khan² and Camiel Doorenweerd³, ¹Univ. of Idaho, Moscow, ID, ²Atomic Energy Research Establishment, Dhaka, Bangladesh, ³Univ. of Hawai'i, Honolulu, HI

D3451 Single-cell biology reveals the evolutionary assembly of a rove beetle chemical defense system. **Adrian Brückner** (bruckner@caltech.edu) and Joseph Parker, California Institute of Technology, Pasadena, CA

D3452 A checklist of the Elmidae (Coleoptera) of Montana, USA with a description of a new species of *Narpus*. **Adrian Massey** (uctrout@me.com), Montana State Univ., Belgrade, MT

D3453 *Neonemobius* ground crickets in the Chicago region. **Carl Strang** (wildlifer@aol.com), Independent Researcher, Warrenville, IL

D3454 A repressor constrains the evolution of new gene expression patterns. **Jian Pu** (pujian@msu.edu)¹, Zinan Wang¹, Joanne Yew² and Henry Chung¹, ¹Michigan State Univ., East Lansing, MI, ²Univ. of Hawai'i, Honolulu, HI

D3455 Matrix-assisted laser desorption ionization mass spectrometry to identify field-collected Neotropical *Anopheles* mosquito vectors of human *Plasmodia*. Jose Loaiza¹, **Alejandro Almanza** (aalmanza@indicasat.org.pa)¹, Juan Rojas², Luis Mejia², Norma Cervantes³, Javier Sanchez-Galan¹, Fernando Merchan⁴, Arnaud Grillet⁵, Matthew Miller⁶, Luis De Leon⁷ and Rolando Gittens², ¹INDICASAT AIP, Ciudad del Saber, Panama, ²INDICASAT AIP, Panama City, Panama, ³Univ. of Texas, El Paso, TX, ⁴Univ. Tecnologica de Panama City, Panama, Panama, ⁵École nationale supérieure d'électronique, informatique, télécommunications, mathématique et mécanique de Bordeaux, Talence Cedex, France, ⁶Univ. of Oklahoma, Norman, OK, ⁷Univ. of Massachusetts, Boston, MA

D3456 Notes on the life history of the delicate silver Y, *Autographa pseudogamma* (Grote, 1875) (Lepidoptera: Noctuidae: Plusiinae). **James Fetzner** (fetznerj@carnegiemnh.org) and Jason Fetzner, Carnegie Museum of Natural History, Pittsburgh, PA

D3457 Does worker body size affect the likelihood of drifting in bumble bees (*Bombus impatiens*)? **Alaina Michaels** (alainamichaels@email.arizona.edu) and Anna Dornhaus, Univ. of Arizona, Tucson, AZ

D3458 The *nalo meli āpa'akuma* project: Sequencing the genome of an endangered Hawaiian bee to inform conservation and management. **Jonathan Koch** (kochj@hawaii.edu)¹, Cynthia B. A. King² and Jolene Sutton¹, ¹Univ. of Hawai'i, Hilo, HI, ²Hawai'i Dept. of Land and Natural Resources, Honolulu, HI

D3459 MIPs for moths. **Nick Miller** (nmiller11@iit.edu)¹ and Dominic Reisig², ¹Illinois Institute of Technology, Chicago, IL, ²North Carolina State Univ., Plymouth, NC

D3460 Phenology of Elmidae (Coleoptera) in Sierra de Huautla, Morelos, Mexico. **Magali Luna-Luna** (amagalliluna@gmail.com)¹ and Atilano Contreras-Ramos², ¹Univ. Autónoma Metropolitana, Ciudad de México, DF, Mexico, ²Univ. Nacional Autónoma de México, Ciudad de México, DF, Mexico

D3461 Does insect/arthropod biodiversity extend beyond earth? **William Romoser** (wromoser@gmail.com), Ohio Univ. (Emeritus), Athens, OH

D3462 Population fluctuations of aphids collected by 10-meter aphid suction tower in the highland agricultural area, Korea. **Seunghwan Lee** (seung@snu.ac.kr)¹, Sanghyeok Nam¹, Minho Lee¹, Min Kwon², Hyojoong Kim³ and Hyeban Namgung³, ¹Seoul National Univ., Seoul, South Korea, ²National Institute of Crop Science, Pyeongchang, South Korea, ³Kunsan National Univ., Gunsan, South Korea

D3463 Comparative characterization of venom components in 14 Aculeate bees/wasps by venom gland transcriptome analysis.

Kyungjae Yoon (kongbob89@snu.ac.kr)¹, Do Eun Lee¹, Young Ho Koh² and Si Hyeock Lee¹, ¹Seoul National Univ., Seoul, South Korea, ²Hallym Univ., Chuncheon, South Korea

D3464 Hoverflies and climate: Exploring climate change-related phenological changes in Danish Syrphidae based on natural history museum collections and citizen science data. Kent Olsen¹, Thomas Holm^{2,3} and **Thomas Simonsen** (t.simonsen@nathist.dk)¹, ¹Natural History Museum, Aarhus, Denmark, ²Aarhus Univ., Rønde, Denmark, ³Naturbasen.dk, Rønde, Denmark

D3465 Establishing DNA barcode database for braconid wasps in South Korea. **Yeonghyeok Yu** (kw7941@hanmail.net), Sang-jin Kim and Hyojoong Kim, Kunsan National Univ., Gunsan, South Korea

D3466 New generic concepts in the Platygastroidea pipeline (Hymenoptera). **Luciana Musetti** (musetti.2@osu.edu), Norman Johnson and Zachary Lahey, The Ohio State Univ., Columbus, OH

D3467 Unexpected high intragenomic variation in two of three major pest thrips species does not affect ribosomal internal transcribed spacer 2 (ITS2) utility for thrips identification. **Vivek Kumar** (vivekuf@gmail.com)¹, Aaron Dickey², Dakshina Seal³, Robert Shatters⁴, Lance Osborne¹ and Cindy McKenzie⁴, ¹Univ. of Florida, Apopka, FL, ²USDA - ARS, Clay Center, NE, ³Univ. of Florida, Homestead, FL, ⁴USDA - ARS, Fort Pierce, FL

D3468 Craigslist, ESA 2019: Entomologists wanted to identify fossil cocoons, pupae, and other traces from a Cretaceous dinosaur nesting locality (Montana, USA). **William Freimuth** (willie.j.freimuth@gmail.com), David Varricchio and Giulio Panasci, Montana State Univ., Bozeman, MT

D3469 Hymenopteramine: Exploring diverse genomic datasets of over 40 hymenopteran species. **Amy Walsh** (walshamy@missouri.edu), Deborah Triant, Md Shamimuzzaman, Justin Le Tourneau and Christine Elsik, Univ. of Missouri, Columbia, MO

Tuesday, November 19

Oral Presentations

TUESDAY, NOVEMBER 18, 2019 • MORNING

ESA Professional Awards Breakfast Featuring the Founders' Memorial Lecture

America's Ballroom (America's Center)

Moderator and Organizer: Robert Peterson, Montana State Univ., Bozeman, MT

7:30 Breakfast
7:50 Honorary Members and Fellows
7:53 ESA Professional Awards
8:08 ESA Certification Awards
8:10 Introduction of the Founders' Memorial Lecture
8:15 **1256** Founders' Memorial Lecture: Tom Eisner: An Incorrigible Entomophile and Innovator Par Excellence. **Walter Leal** (wsleal@ucdavis.edu), Univ. of California, Davis, CA
8:45 Concluding Remarks

Program Workshop: If They're Laughing, They're Listening

Room 261 (America's Center)

Moderators and Organizers: Meaghan Pimsler¹, Lauren Diepenbrock² and Brian Lovett³, ¹Univ. of Alabama, Tuscaloosa, AL, ²Univ. of Missouri, Columbia, MO, ³Univ. of Maryland, College Park, MD

9:00 **1257** If they're laughing, they're listening. **Kyle Sanders** (kyle@scienceriot.org)¹ and Jessie Hanson², ¹Science Riot, Little Rock, AR, ²Science Riot, Denver, CO

9:00 AM - 10:30 AM and 10:45 AM - 12:15 PM

MUVE Section Symposium: Promoting Warfighter Readiness: DoD-Funded Entomology Research and Product Development

Room 121 (America's Center)

Moderators and Organizers: Gabriela Zollner¹ and Erica Lindroth², ¹Armed Forces Pest Management Board, Silver Spring, MD, ²US Army, Silver Spring, MD

9:00 **1258** How sweet it is: Artificial sweeteners as ATSB Toxicants for *Aedes aegypti* and *Anopheles darlingi* mosquitoes in SOUTHCOM. **Michael Fisher** (michael.l.fisher80.mail@mail.mil)¹, Gissella Vasquez², Victor Lopez¹ and Karin Escobedo¹, ¹US Naval Medical Research Unit 6, Lima, Peru, ²US Naval Medical Research Unit 6, Callao, Peru

9:15 **1259** RNAi-based strategies for control of *Aedes* mosquitoes. **Keshava Mysore** (kmysore@iu.edu)¹, Limb Hapairai², Longhua Sun¹ and Molly Scheel¹, ¹Univ. of Notre Dame, South Bend, IN, ²Brigham Young Univ., Provo, UT

9:30 **1260** The next generation of vector-control devices. **Noel Elman** (noel.elman@gmail.com)¹, Uli Bernier², Daniel Kline², Melynda Perry³, Sebastian D'hers⁴, Michael Fisher⁵ and Gissella Vasquez⁶, ¹GearJump Technologies LLC, Revere, MA, ²USDA - ARS, Gainesville, FL, ³US Army Futures Command, Natick, MA, ⁴Buenos Aires Institute of Technology, Buenos Aires, Argentina, ⁵US Naval Medical Research Unit 6, Lima, Peru, ⁶US Naval Medical Research Unit 6, Callao, Peru

9:45 **1261** In the field with MAGE: A mobile app adapted for vector surveillance. **Brian Knott** (brian.d.knott4.mail@mail.mil), US Army Medical Research Directorate, Tblisi, Georgia

10:00 **1262** Extending the PIRK, transfluthrin-based technology to fighting tick-borne disease. **Laurie Widder** (lwidder@widderbros.com)¹ and Catherine Hill², ¹Novel Textiles & Treatments, LLC, New York, NY, ²Purdue Univ., West Lafayette, IN

10:15 **1263** Optimizing transfluthrin-treated devices for deterrence of mosquitoes from approaching and entering permethrin treated tents. **James Mutunga** (james.mutunga@usamru-k.org), David Oullo, Sheila Ogoma, Thomas Gilbreath and Wesley McCardle, US Army Medical Research Directorate, Kisumu, Kenya

10:30 **1264** The mobile pesticide app. **Seth Britch** (seth.britch@usda.gov) and Kenneth J. Linthicum, USDA - ARS, Gainesville, FL

10:45 **1265** Spatial repellency and toxicity of halogenated phenylamides and related analogs. **Kenneth J. Linthicum** (kenneth.linthicum@ars.usda.gov)¹, Quentin Coquerel², Gary Richoux², Liu Yang² and Jeffrey Bloomquist², ¹USDA - ARS, Gainesville, FL, ²Univ. of Florida, Gainesville, FL

MUVE Section Symposium: Urban Pests and Vectors: Emerging Impacts, Sustainable Management, and Future Research

Room 120 (America's Center)

Moderator and Organizer: Paul T. Leisnham, Univ. of Maryland, College Park, MD

9:00 Introductory remarks

9:15 **1266** A test of pre-adaptation to invade. **Dina Fonseca** (dina.fonseca@rutgers.edu)¹, Francis Schaffner², Jiawu Xu¹, Motoyoshi Mogi³, Terry Klein⁴, Heung-Chul Kim⁴ and Laura D. Kramer⁵, ¹Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, ²Univ. of Zürich, Zürich, Switzerland, ³Saga Medical School, Saga, Japan, ⁴US Army, DPO, South Korea, ⁵New York State Dept. of Health, Slingerlands, NY

9:30 **1267** Is dog heartworm an urban disease? The landscape ecology of an obligate vector-borne parasite. **Meredith Spence Beaulieu** (meredithspence@gmail.com) and Michael Reiskind, North Carolina State Univ., Raleigh, NC

9:45 **1268** Immune response of *Cimex lectularius* to infection with entomopathogenic bacteria and vertebrate pathogens. **Jonas G. King** (jonas.king@msstate.edu)¹, Tony Zybrowski¹, Jose Pietri² and Aline Badial¹, ¹Mississippi State Univ., Mississippi State, MS, ²Univ. of South Dakota School of Medicine, Vermillion, SD

10:00 **1269** Assessing arthropod bite exposure in Kansas: New perspectives for evaluating vector – host interactions. **Berlin Londono** (blondono@ksu.edu), Kansas State Univ., Manhattan, KS

10:15 **1270** Population genetics of invasive mosquitoes: The rise of *Aedes aegypti* and *Ae. albopictus*. **Andrea Gloria-Soria** (andrea.gloria-soria@ct.gov), The Connecticut Agricultural Experiment Station, New Haven, CT

10:30 Break

10:45 **1271** How do we understand a hurricane like Maria? Urban populations of *Aedes aegypti* and nutrients in San Juan, Puerto Rico, USA. **Donald Yee** (donald.yee@usm.edu), Nicole Scavo and Limarie Reyes, The Univ. of Southern Mississippi, Hattiesburg, MS

Tuesday, November 19

Oral Presentations

10:50 **1292** Beneficial enemies from the sky: Use of drones to release predatory mites in pecan orchards. **Angelita Acebes-Doria** (aacebes@uga.edu)¹, Kate Phillips¹, David Shapiro-Ilani², Ted Cottrell², William Hudson³ and Glen Rains¹, ¹Univ. of Georgia, Tifton, GA, ²USDA - ARS, Byron, GA, ³Univ. of Georgia, Athens, GA

11:05 **1293** Releasing beneficials with drones to manage aphids in commercial organic lettuce. **Alejandro Del Pozo** (adelpozo@ucanr.edu)¹, Eric Morgan² and Chandler Bennett³, ¹Univ. of California Cooperative Extension, Salinas, CA, ²Braga Fresh Farms, Soledad, CA, ³Parabug Solutions, Salinas, CA

11:20 **1294** Angels of death: The use of drones in the biological control of weeds. **Carey Minteer** (c.minteerkillian@ufl.edu)¹, Ashley Goode², Aaron David², Ellen C. Lake² and Philip Tipping², ¹Univ. of Florida, Fort Pierce, FL, ²USDA - ARS, Fort Lauderdale, FL

11:35 **1295** Everything old is new again: Codling moth SIR in Washington State. **Elizabeth Beers** (ebeers@wsu.edu)¹, Kacie Athey², Tobin Northfield³, David Crowder⁴ and Jay Brunner¹, ¹Washington State Univ., Wenatchee, WA, ²Univ. of Kentucky, Lexington, KY, ³James Cook Univ., Cairns, QLD, Australia, ⁴Washington State Univ., Pullman, WA

11:50 **SP1296** Working smarter, not harder: Enhancing annual surveying for rangeland grasshoppers and mormon crickets by testing UAS-mounted sensors with a smart rangeland system. **Derek Woller** (derek.a.woller@usda.gov)¹, Chris Reuter¹, Lonnie Black¹, Larry E. Jech¹, Nathan Moses-Gonzales², Michael Milam², Benjamin Humpherys³, Katrina Merritt³ and Khang Nguyen⁴, ¹USDA - APHIS, Phoenix, AZ, ²M3 Consulting Group, Dayton, OH, ³Arizona State Univ., Tempe, AZ, ⁴Mr. Khang's Workshop, Chandler, AZ

P-IE Section Symposium: An Advocate for Biological Control: Honoring the Career of Dick Reardon

Room 265 (America's Center)

Moderators and Organizers: Joseph Elkinton¹ and David Wagner², ¹Univ. of Massachusetts, Amherst, MA, ²Univ. of Connecticut, Storrs, CT

9:00 **1297** Richard Reardon's legacy to knowledge of non-target effects, early stages, and the conservation status of North American Lepidoptera. **Dale Schweitzer** (dfstnc@aol.com)¹ and David Wagner², ¹NatureServe (retired), Port Norris, NJ, ²Univ. of Connecticut, Storrs, CT

9:15 **1298** Contributions to understanding, enhancement, and documentation of biocontrol of forest pests. **Roy Van Driesche** (vandries@cns.umass.edu), Univ. of Massachusetts, Amherst, MA

9:30 **1299** Slides, photo CDs, ForestryImages.org, invasive plants and iBiocontrol – 25 years of Bugwood. **C. T. Bargeron** (cbargeron@uga.edu), Univ. of Georgia, Tifton, GA

9:45 **1300** Biological control of winter moth. **Joseph Elkinton** (elkinton@ent.umass.edu), George Boettner and Hannah Broadley, Univ. of Massachusetts, Amherst, MA

10:00 **1301** Protection of North American ash against emerald ash borer with biological control: Potential for success and challenges. **Jian Duan** (jian.duan@ars.usda.gov)¹, Leah S. Bauer², Roy Van Driesche³, Joseph Elkinton³, Claire E. Rutledge⁴ and Juli Gould⁵, ¹USDA - ARS, Newark, DE, ²USDA - Forest Service, Lansing, MI, ³Univ. of Massachusetts, Amherst, MA, ⁴Connecticut Agricultural Experiment Station, New Haven, CT, ⁵USDA - APHIS, Buzzards Bay, MA

10:15 **1302** Biological control of gypsy moth. **Ann E. Hajek** (aeh4@cornell.edu), Cornell Univ., Ithaca, NY

10:30 Break

10:45 **1303** Has the dedicated and continuous investment into biological control for hemlock woolly adelgid paid off? **Scott Salom** (salom@vt.edu), Virginia Polytechnic Institute and State Univ., Blacksburg, VA

11:00 **1304** Knotweed biocontrol. **Fritzi Grevstad** (fritzi.grevstad@science.oregonstate.edu), Oregon State Univ., Corvallis, OR

11:15 **1305** Biological control of mile-a-minute weed: Challenges, accomplishments, and lessons learned. **Ellen C. Lake** (ellen.lake@ars.usda.gov), USDA - ARS, Fort Lauderdale, FL

11:30 **1306** Advances in biological control of exotic toadflaxes. **Sharlene Sing** (sharlene.sing@usda.gov)¹, David Weaver², Sarah Ward³ and Carol Randall⁴, ¹USDA - Forest Service, Bozeman, MT, ²Montana State Univ., Bozeman, MT, ³Colorado State Univ., Fort Collins, CO, ⁴USDA - Forest Service, Smeiterville, ID

11:45 **1307** "Chem-herding" biocontrol agents for saltcedar. **David Weaver** (weaver@montana.edu)¹, Alexander Gaffke^{1,2} and Sharlene Sing^{1,3}, ¹Montana State Univ., Bozeman, MT, ²USDA - ARS, Gainesville, FL, ³USDA - Forest Service, Bozeman, MT

P-IE Section Symposium: Charles Valentine Riley: Founding Advocate for Entomology

Room 240 (America's Center)

Moderators and Organizers: Donald C. Weber¹ and Carol Anelli², ¹USDA - ARS, Beltsville, MD, ²The Ohio State Univ., Columbus, OH

9:00 Introductory remarks

9:10 **1308** Genesis and development of the biography. **Janet Smith Moore** (mp341683@gmail.com)¹, Elizabeth Motherwell² and Carol Anelli³, ¹Writer, Asheville, NC, ²Univ. of Alabama Press (retired), Tuscaloosa, AL, ³The Ohio State Univ., Columbus, OH

9:25 **1309** C.V. Riley: European origins. **W. Conner Sorenson** (wcsbtrs@gmail.com), Historian, Eschbach, Germany

9:40 **1310** Charles V. Riley's periodical cicada papers and the lost manuscript of Gideon B. Smith. **Gene Krinsky** (gene.krinsky@msj.edu), Mount St. Joseph Univ., Cincinnati, OH

9:55 **1311** Riley's nine Missouri reports: Testament to creative genius, scientific networking, and Darwinian theory. **Carol Anelli** (anelli.7@osu.edu), The Ohio State Univ., Columbus, OH

10:10 **1312** A tale of two cities, St. Louis and Washington, central to the life of C.V. Riley. **Donald C. Weber** (don.weber@ars.usda.gov)¹ and Thomas Turpin², ¹USDA - ARS, Beltsville, MD, ²Purdue Univ., West Lafayette, IN

10:25 Break

10:35 **1313** Rocky Mountain locust: Devastation to disappearance. **Jeffrey Lockwood** (lockwood@uwyo.edu), Univ. of Wyoming, Laramie, WY

10:50 **1314** Phylloxera: Partnership to save the french vineyards; A Riley's hello from France! **Yves Carton** (yves.carton@egc.cnrs-gif.fr), Univ. Paris-Saclay, Gif-sur-Yvette, France

Oral Presentations

Member Symposium: Effects of Land Management and Disturbance on Wild Bee Communities

Room 231 (America's Center)

Moderator and Organizer: Seth Davis, Colorado State Univ., Fort Collins, CO

9:00 Introductory remarks

9:00 **1337** Conserving pollinators in the longleaf pine ecosystem. **Michael D. Ulyshen** (mulyshen@fs.fed.us)¹, Kevin Hiers², Scott Pokswinski², Kevin Robertson², Cinammon Morrison² and Conor Fair³, ¹USDA - Forest Service, Athens, GA, ²Tall Timbers Research Station, Tallahassee, FL, ³Univ. of Georgia, Athens, GA

9:30 **1338** Understanding and accommodating multiple resource requirements for wild bees when managing habitat on reclaimed mines. **Karen Goodell** (goodell.18@osu.edu), The Ohio State Univ., Newark, OH

9:45 **1339** Natural areas: Reservoirs for native bees? **Terry Griswold** (terry.griswold@ars.usda.gov), USDA - ARS, Logan, UT

10:00 **1340** The influence of forest management on pollinators in the Oregon Coast Range. **Sara Galbraith** (sara.galbraith@oregonstate.edu)¹, James Rivers¹, Matthew G. Betts¹, Robert A. Progar², Andrew R. Moldenke¹ and Sarah Kincaid³, ¹Oregon State Univ., Corvallis, OR, ²USDA - Forest Service, La Grande, OR, ³Oregon Dept. of Agriculture, Salem, OR

10:15 Break

10:30 **1341** A meta-analysis of fire effects on bees. **Stephen Mason** (scm77@drexel.edu)¹, Vaughn Shirey², Lauren Ponisio³ and Jon K. Gelhaus¹, ¹Drexel Univ., Philadelphia, PA, ²Georgetown Univ., Washington, DC, ³Univ. of California, Riverside, CA

10:45 **1342** Managing forested riparian areas for pollinators: Effects of ungulate herbivory and restoration on native bees. **Sandra DeBano** (sandy.debano@oregonstate.edu)¹, Mary Rowland², Skyler Burrows³, Scott Mitchell¹, Lauren Smith DiCarlo⁴ and Samantha Roof¹, ¹Oregon State Univ., Hermiston, OR, ²USDA - Forest Service, La Grande, OR, ³Utah State Univ., Logan, UT, ⁴Westfield State Univ., Westfield, MA

11:00 **1343** Are bees repelled by MCH, an antiaggregation pheromone used to manage bark beetles? **Justin Runyon** (jrunyon@fs.fed.us)¹, Gabriel Foote², Christopher J. Fettig³ and Darrell W. Ross², ¹USDA - Forest Service, Bozeman, MT, ²Oregon State Univ., Corvallis, OR, ³USDA - Forest Service, Davis, CA

11:15 **1344** Turnover of plant and pollinator communities across a conifer encroachment gradient alters pollination network stability. **William Glenny** (willglenny@gmail.com)¹, Justin Runyon² and Laura A. Burkle¹, ¹Montana State Univ., Bozeman, MT, ²USDA - Forest Service, Bozeman, MT

11:30 **1345** Intensity of agricultural management impacts community composition of bumble bees and their parasites. **James Strange** (james.strange@ars.usda.gov) and Amber Tripodi, USDA - ARS, Logan, UT

11:45 **1346** Effects of agroforestry on native bees: A systematic review. **Gary Bentrup** (gary.bentrup@usda.gov)¹, Jennifer Hopwood², Nancy Adamson³, Mace Vaughan² and Rae Powers⁴, ¹USDA - Forest Service, Lincoln, NE, ²Xerces Society for Invertebrate Conservation, Portland, OR, ³Xerces Society for Invertebrate Conservation, Greensboro, NC, ⁴Xerces Society for Invertebrate Conservation, Lincoln, NE

Member Symposium: Entomology Advocacy as a Conduit for Biodiversity Conservation: 7th Latin American/Hispanic Symposium

Room 127 (America's Center)

Moderators and Organizers: Ricky Lara¹, Silvia Rondon², Ismael E. Badillo-Vargas³, Ana Legrand⁴ and Lina Bernaola⁵, ¹Univ. of California, Riverside, CA, ²Oregon State Univ., Hermiston, OR, ³Texas A&M Univ., College Station, TX, ⁴Univ. of Connecticut, Storrs, CT, ⁵Louisiana State Univ., Baton Rouge, LA

9:00 Welcoming remarks

9:05 **1351** Spider ambassadors: Biodiversity outreach as a conduit for stewardship in the Caribbean. **Lauren Esposito** (lesposito@calacademy.org), California Academy of Sciences, San Francisco, CA

9:35 **1348** Microhabitats and refugia provide insights into insect biodiversity and global warming. **Christina S. Baer** (christina.baer@uconn.edu) and Carlos Garcia-Robledo, Univ. of Connecticut, Storrs, CT

9:50 **1349** An examination of vector-borne disease transmission risk in natural and anthropogenic environments of Panama: Across a gradient of habitat alteration. **Jose Loaiza** (jloaiza@indicasat.org.pa), INDICASAT AIP, Ciudad del Saber, Panama

10:05 Break

10:15 **1350** Pollinators without borders. Magda Argueta Guzman, **Marilia Gaiarsa** (gaiarsa.mp@gmail.com) and Lauren Ponisio, Univ. of California, Riverside, CA

10:30 **1352** The use of biological control as a conservation tool to control the vampire fly in the Galapagos islands. **Ismael Ramirez** (ramir238@umn.edu)¹, George Heimpel¹, Charlotte Causton² and Martin Quiroga³, ¹Univ. of Minnesota, St. Paul, MN, ²Charles Darwin Foundation for the Galapagos Islands, Galapagos Islands, Ecuador, ³Univ. Nacional del Litoral, Esperanza, Argentina

10:45 **1353** Backyard biodiversity: Public engagement enables insect discoveries in Los Angeles. **Lisa Gonzalez** (lgonzale@nhm.org), Brian V. Brown and Benjamin Adams, Natural History Museum of Los Angeles County, Los Angeles, CA

11:00 Panel discussion

Member Symposium: Monitoring and Managing the Fall Armyworm, *Spodoptera frugiperda* in Africa and Asia

Room 267 (America's Center)

Moderators and Organizers: Rangaswamy Muniappan and Amer Fayad, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

9:00 Introductory remarks

9:15 **1354** USAID's role in management of the fall armyworm in the developing world. **John Bowman** (jobowman@usaid.gov), US Agency for International Development, Washington, DC

9:30 **1355** Present status and management options for the fall armyworm, *Spodoptera frugiperda* (J.E. Smith) in India. **Asokan Ramasamy** (asokaniilr@gmail.com), ICAR, Bangalore, India; Indian Institute of Horticultural Research, Bangalore, India

9:45 **1356** Presentation withdrawn

Tuesday, November 19

ORAL

Oral Presentations

Member Symposium: The Intersection of Industry and Research: Semiochemical Solutions for Major Agricultural Pests

Room 280 (America's Center)

Moderators and Organizers: Brent Short and Danielle Kirkpatrick, Trece, Inc., Adair, OK

9:00 Introductory remarks

9:00 **1377** California nut crops adopting mating disruption for a top pest: Navel orangeworm. **David Haviland** (dhaviland@ucdavis.edu)¹, Jhalendra Rijal² and Stephanie Rill¹, ¹Univ. of California Cooperative Extension, Bakersfield, CA, ²Univ. of California Agriculture and Natural Resources, Modesto, CA

9:15 **1378** Developments in codling moth mating disruption in walnuts. **Emily Symmes** (ejsymmes@ucanr.edu)¹ and Greg Krawczyk², ¹Univ. of California, Oroville, CA, ²Pennsylvania State Univ., Biglerville, PA

9:30 **1379** Assessing commercial high-density orchard management of dogwood borer, *Synanthedon scitula* Harris, with pheromone mating disruption in NYS. **Peter Jentsch** (pj5@cornell.edu) and Lucas Canino, Cornell Univ., Highland, NY

9:45 **1380** New technology for mating disruption of cranberry fruitworm and Sparganothis fruitworm. **Elissa M. Chasen** (emchasan@wisc.edu)¹, Shawn Steffan², Brent Short³ and Bill Lingren⁴, ¹Univ. of Wisconsin, Madison, WI, ²USDA - ARS, Madison, WI, ³Treće Inc., Adair, OK, ⁴Treće Inc., Adair, OK

10:00 **1381** Semiochemical solutions for management of post-harvest insect pests. **James Campbell** (james.campbell@ars.usda.gov), USDA - ARS, Manhattan, KS

10:15 **1382** Investigating monitoring systems for *Drosophila suzukii* (Diptera: Drosophilidae) to guide management decisions in Michigan tart cherry. **Emily Pochubay** (pochubay@msu.edu)¹, Nikki Rothwell², Karen Powers² and Larry Gut³, ¹Michigan State Univ. Extension, Traverse City, MI, ²Michigan State Univ., Traverse City, MI, ³Michigan State Univ., East Lansing, MI

10:30 Break

10:45 **1383** Convergent management strategies: The intersection of netting and semiochemicals for insect control. **Adrian Marshall** (atmarshall@wsu.edu), James Hepler and Elizabeth Beers, Washington State Univ., Wenatchee, WA

11:00 **1384** Development of behaviorally based monitoring and biosurveillance tools for the invasive spotted lanternfly, *Lycorma delicatula*. **Laura Nixon** (laura.nixon@ars.usda.gov)¹, Dalton Ludwick², Heather Leach³, Julie Urban³, Danielle Kirkpatrick⁴, Brent Short⁴, Bill Lingren⁴ and Tracy C. Leskey¹, ¹USDA - ARS, Kearneysville, WV, ²Virginia Polytechnic Institute and State Univ., Kearneysville, WV, ³Pennsylvania State Univ., University Park, PA, ⁴Treće, Inc., Adair, OK

11:15 **1385** Combination of plant and insect semiochemicals for management of chrysomelid vegetable pests. **Guillermo Cabrera Walsh** (gcabrera@fuedei.org)¹, Ashot Khrimian² and Donald C. Weber², ¹Fundación para el Estudio de Especies Invasivas, Hurlingham, Argentina, ²USDA - ARS, Beltsville, MD

11:30 **1386** Use and refinement of pheromone traps to monitor pepper weevil in southern Georgia and Ontario, Canada. **Alton Sparks** (asparks@uga.edu)¹, Ryan Weredyk¹, Ty Torrance², Jeremy Kichler³, Stephanie Hollifield⁴, Justin Shealey⁵, Cassandra Russell⁶ and Rebecca Hallett⁶, ¹Univ. of Georgia, Tifton, GA, ²Univ. of Georgia, Cairo, GA, ³Univ. of Georgia, Moultrie, GA, ⁴Univ. of Georgia, Quitman, GA, ⁵Univ. of Georgia, Statenville, GA, ⁶Univ. of Guelph, Guelph, ON, Canada

11:45 **1387** Plum curculio trapping and management in New Jersey peaches. **Clement Akotsen-Mensah** (ca555@scarletmail.Rutgers.edu), Tim Lampasona and Anne Nielsen, Rutgers, The State Univ. of New Jersey, Bridgeton, NJ

12:00 Concluding remarks

Member Symposium: The Staphylinidae Verses: 63,000 Stanzas Long

Room 130 (America's Center)

Moderators and Organizers: Brittany Owens¹ and Michael Ferro², ¹Louisiana State Univ., Baton Rouge, LA, ²Clemson Univ., Clemson, SC

9:00 Welcoming remarks

9:05 **1388** Diversity and distribution of the New Zealand Pselaphinae (Coleoptera: Staphylinidae). **Brittany Owens** (brittanyeowens@gmail.com) and Christopher E. Carlton, Louisiana State Univ., Baton Rouge, LA

9:20 **1389** New Aleocharinae (Staphylinidae) from New Zealand. **Richard A. B. Leschen** (leschenr@landcareresearch.co.nz)¹, Igor Orlov², Alfred Newton³ and Vladimir Gusarov⁴, ¹Landcare Research, Auckland, New Zealand, ²Statens Naturhistorisk Museum, København, Denmark, ³Field Museum of Natural History, Chicago, IL, ⁴Natural History Museum, Oslo, Norway

9:35 **1390** Diversification in the Palearctic genus *Leptobium* Casey (Coleoptera, Staphylinidae). **Vladimir Gusarov** (vladimir.gusarov@nhm.uio.no)¹ and Sinan Anlaş², ¹Natural History Museum, Oslo, Norway, ²Celal Bayar Univ., Alaşehir, Turkey

9:50 **1391** Systematics of *Coiffaitia* (Euaesthetinae), an enigmatic genus endemic to Madagascar. **Dave Clarke** (djclarke@memphis.edu)¹, Alfred Newton² and Margaret Thayer², ¹Univ. of Memphis, Memphis, TN, ²Field Museum of Natural History, Chicago, IL

10:05 **1392** Secondary sexual characters in Pselaphinae beetles (Coleoptera: Staphylinidae). **Laura Vasquez-Velez** (lvasque@clemson.edu), Clemson Univ., Clemson, SC

10:20 **1393** *Smokytychus*, a fantastic new genus of Pselaphinae (Staphylinidae). **Christopher E. Carlton** (ccarl@lsu.edu) and Brittany Owens, Louisiana State Univ., Baton Rouge, LA

10:35 **1394** Phylogeny of the burying beetles based on morphological and molecular data. **Derek Sikes** (dssikes@alaska.edu), Univ. of Alaska, Fairbanks, AK

10:50 Concluding remarks

10-min: MUVE, Termites, Ants, and Stinging Pests

Room 122 (America's Center)

Moderators: Joe DeMark¹ and David Oi², ¹Corteva Agriscience, Fayetteville, AR, ²USDA - ARS, Gainesville, FL

9:00 **1395** The use of an essential oil adjuvant to improve the efficacy of heat treatments targeting the western drywood termite. **Daniel Perry** (dperr006@ucr.edu) and Dong-Hwan Choe, Univ. of California, Riverside, CA

9:10 **1396** Use of noviflumuron baits in above-ground stations for colony elimination of the Asian subterranean termite, *Coptotermes gestroi* (Wasman) (Blattodea: Rhinotermitidae). **Nan-Yao Su** (nysu@ufl.edu), Thomas Chouenc and Aaron Mullins, Univ. of Florida, Davie, FL

Tuesday, November 19

ORAL

Oral Presentations

9:20 **1397** Field performance of a caulk-like bait containing noviflumuron to *C. formosanus* Shiraki. **Joe DeMark** (joe.demark@corcova.com)¹, Barry Yokum², Mary Rushton³ and Neil Spomer³, ¹Corteva Agriscience, Fayetteville, AR, ²City of New Orleans Mosquito, Termite & Rodent Control Board, New Orleans, LA, ³Corteva Agriscience, Indianapolis, IN

9:30 **1398** Formosan and Asian subterranean termite tunneling behavior and their sustainable management using physical barrier. **Jia-Wei Tay** (jwtay@hawaii.edu), Univ. of Hawai'i, Honolulu, HI

9:40 **1399** Hemolymph protein profiles of subterranean termite *Reticulitermes flavipes* challenged with methicillin resistant *Staphylococcus aureus* or *Pseudomonas aeruginosa*. **Yuan Zeng** (yuan.zeng@colostate.edu)¹, Xing Ping Hu², Guanqun Cao² and Sang-Jin Suh², ¹Colorado State Univ., Fort Collins, CO, ²Auburn Univ., Auburn, AL

9:50 **1400** Four-year field evaluations of a novaluron bait against western subterranean termite yield trends and questions associated with efficacy, pest phenology, and taxonomy. **Andrew Sutherland** (amsutherland@ucanr.edu)¹ and Casey Hubble², ¹Univ. of California, Hayward, CA, ²Univ. of California, Concord, CA

10:00 **1401** Efficacy of non-repellent insecticide treatments on nests of the western carpenter ant (*Camponotus modoc* Wheeler) in New Mexico, USA. Matthew Lee¹ and **Bob Davis** (robert.davis@basf.com)², ¹Entomology Consultants, Mesilla Park, NM, ²BASF Corporation, Pflugerville, TX

10:10 **1402** Effects of early spring baiting on tawny crazy ant infestations around buildings. **David Oi** (david.oi@ars.usda.gov), Sedonia Steininger and Katy Lawson, USDA - ARS, Gainesville, FL

10:20 Break

10:30 **1403** Contact toxicity and horizontal transfer of DX13™ dust in the European fire ant, *Myrmica rubra* (Hymenoptera: Formicidae). **Yasmin Akhtar** (yasmin.akhtar@ubc.ca) and Murray B Isman, The Univ. of British Columbia, Vancouver, BC, Canada

10:40 **1404** Chemically induced aggression in red imported fire ants, *Solenopsis invicta* Buren. **Jian Chen** (jian.chen@ars.usda.gov), USDA - ARS, Stoneville, MS

10:50 **1405** Soiling avoidance by ants. **Casey Shaw** (cshaw@koppert.com), Koppert Biological Systems, Howell, MI; Michigan State Univ., East Lansing, MI

11:00 **1406** Ants and acetone: A story of not-so-strange attraction. **Emmaline Gates** (gatesem@tamu.edu), Jennifer H. Sweeney, Jeffery K. Tomberlin and Robert Puckett, Texas A&M Univ. College Station, TX

11:10 **1407** Rescue® TrapStiks for wasps, mud daubers, and carpenter bees. **Qing-He Zhang** (qing-he@rescue.com), Sterling International, Inc, Spokane, WA

11:20 **1408** Using outreach strategies to manage bark scorpions (*Centruroides* spp.) in a Coachella Valley community. **Kim Hung** (khung@cvmvcd.org), Melissa Snelling and Jill Oviatt, Coachella Valley Mosquito and Vector Control District, Indio, CA

11:30 **1409** Bark scorpions of public health importance in the southwestern United States. **Alvaro Romero** (aromero2@nmsu.edu) and John Agnew, New Mexico State Univ., Las Cruces, NM

11:40 **1410** Stilting behavior in the Arizona bark scorpion. **John Agnew** (agnewj@nmsu.edu) and Alvaro Romero, New Mexico State Univ., Las Cruces, NM

10-min: MUVE, Veterinary and Forensic Entomology

Room 132 (America's Center)

Moderators: Dana Nayduch¹ and Edwin Burgess², ¹USDA - ARS, Manhattan, KS, ²Northern Illinois Univ., DeKalb, IL

9:00 **1411** Developing polyols as filth fly insecticides: Current findings and future directions. **Edwin Burgess, IV** (tedwin183@comcast.net)¹, Christopher Geden², Dana Johnson³ and Bethia H. King¹, ¹Northern Illinois Univ., DeKalb, IL, ²USDA - ARS, Gainesville, FL, ³Univ. of Florida, Gainesville, FL

9:10 **1412** Effects of habitat on the bacterial community composition and diversity in the gut of female house flies (*Musca domestica*). **Saraswoti Neupane** (sneupane@ksu.edu)¹ and Dana Nayduch², ¹Kansas State Univ., Manhattan, KS, ²USDA - ARS, Manhattan, KS

9:20 **1413** Insecticide resistance and oviposition behavior effects of adult house flies (Diptera: Muscidae) due to larval population exposures to commercially-available bait formulations.

Jimmy Pitzer (jimmy.pitzerjr@csus.edu), California State Univ., Sacramento, CA

9:30 **1414** Effects of fly sex and environment on bacterial carriage by adult house flies (*Musca domestica*). **Dana Nayduch** (dana.nayduch@usda.gov)¹, Saraswoti Neupane² and Jessica Thomson², ¹USDA - ARS, Manhattan, KS, ²Kansas State Univ., Manhattan, KS

9:40 **1415** Advances in development of transgenic New World screwworm, *Cochliomyia hominivorax*, for population control and eradication. **Alex Arp** (alex.arp@usda.gov)¹, A. Sagel², Max Scott³ and Adalberto A. Pérez de León¹, ¹USDA - ARS, Kerrville, TX, ²USDA - ARS, Panama City, Panama, ³North Carolina State Univ., Raleigh, NC

9:50 **1416** Update on sampling of contemporary populations of the New World screwworm (*Cochliomyia hominivorax*) in the Caribbean. **Robert Mitchell** (rdmitche@ncsu.edu), USDA - ARS, Kerrville, TX

10:00 **1417** Stable isotope analysis of adult blow flies (Diptera: Calliphoridae) reveals larval diet. **Charity Owings** (cgowings@iupui.edu), William Gilhooley III and Christine Picard, Indiana Univ.-Purdue Univ., Indianapolis, IN

10:10 **1418** Improved mating success in *Hermetia illucens* enabled by adult visual system. **Fen Zhu** (zhufen@mail.hzau.edu.cn), Zhenghui Gao, Wan-Qiang Wang, Xinghui Liu, Wen Liu and Xiao-Ping Wang, Huazhong Agricultural Univ., Wuhan, China

10:20 **1419** Chicken body louse *Menacanthus stramineus* effects on poultry behavior and welfare. **Amy C. Murillo** (alock001@ucr.edu)¹, Richard Blatchford², Alireza Abdoli¹, Eamonn Keogh¹ and Alec Gerry¹, ¹Univ. of California, Riverside, CA, ²Univ. of California, Davis, CA

10:30 **1420** Control of northern fowl mite (*Ornithonyssus sylviarum*) on layer chickens using a fluralaner solution administered through drinking water. **Alec Gerry** (alec.gerry@ucr.edu)¹, Levi Zahn¹, Amy C. Murillo¹, Caleb Hubbard¹ and Faris Jirjis², ¹Univ. of California, Riverside, CA, ²Merck Animal Health, Madison, NJ

10:40 **1421** Molecular epidemiology of tropical bovine theileriosis in relation to tick infestation in dairy cattle from Punjab Province, Pakistan. **Muhammad Nazir** (mudasser.nazir@bzu.edu.pk¹), Muhammad Mazhar Ayaz¹, Asim Faraz¹, Tanveer Ahmad¹, Qaisar Akram², Faisal Kiani¹ and Muhammad Oneeb³, ¹Bahauddin Zakariya Univ., Multan, Pakistan, ²Bahauddin Zakariya Univ., Layyah, Pakistan, ³Univ. of Veterinary and Animal Sciences, Lahore, Pakistan

Oral Presentations

10:50 **1422** The kinin signaling system in the cattle fever tick (*Rhipicephalus microplus*): Why so many kinins? **Patricia Pietrantonio** (p-pietrantonio@tamu.edu)¹, Ronald Nachman² and Caixing Xiong¹, ¹Texas A&M Univ., College Station, TX, ²USDA - ARS, College Station, TX

11:00 **1423** Survival and reproduction of *Culicoides sonorensis* (Diptera: Ceratopogonidae) orally infected with epizootic hemorrhagic disease virus serotype 2. **Dinesh Erram** (derram@ufl.edu) and Nathan Burkett-Cadena, Univ. of Florida, Vero Beach, FL

10-min: PBT, Bee Physiology and Health

Room 274 (America's Center)

Moderators: Julia Bowsher¹ and Frank Rinkevich², ¹North Dakota State Univ., Fargo, ND, ²USDA - ARS, Baton Rouge, LA

9:00 **1424** Production of long-lived honey bees on a subtropical island under experimental and typical conditions. **Mehmet Döke** (malidoke@gmail.com)¹, Stephanie Feliciano¹, Janpierre Alemán Ríos¹, Jose Agosto-Rivera¹, Christina M. Grozinger² and Tugrul Giray¹, ¹Univ. of Puerto Rico, San Juan, PR, ²Pennsylvania State Univ., University Park, PA

9:10 **1425** Where do honey bees sleep? **Barrett Klein** (barrett@pupating.org)¹ and M. Kathryn Busby², ¹Univ. of Wisconsin, La Crosse, WI, ²Univ. of Arizona, Tucson, AZ

9:20 **1426** Interplay between selenium, selenoprotein genes, and oxidative stress in honey bee *Apis mellifera*. **Mohamed Alburaki** (mohamed.alburaki@usm.edu)¹, John Adamczyk² and Shahid Karim¹, ¹The Univ. of Southern Mississippi, Hattiesburg, MS, ²USDA - ARS, Poplarville, MS

9:30 **1427** Long-term memory and aversive learning in honey bees. **Fanfan Noel** (fanfan.noel@upr.edu), Mehmet Döke, Tugrul Giray, Luz A. Sanchez Lopez and Michael De Jesús Soto, Univ. of Puerto Rico, San Juan, PR

9:40 **1428** Here for the free food - learnings from higher tier testing with bumble bees. **Maryam Sultan** (maryam.sultan@bayer.com)¹, Guido Sterk², Paraskevi Kolokytha², Ana Cabrera³ and Thomas Preuss¹, ¹Bayer AG, Monheim am Rhein, Germany, ²IPM Impact, Hasselt, Belgium, ³Bayer Crop Science, Research Triangle Park, NC

9:50 **1429** Interactions between temperature and loading on flight metabolic rate and wing beat frequency in the honey bee, *Apis mellifera*. **Jon Harrison** (j.harrison@asu.edu), Ekwutosi Ohoru and Jennifer H. Fewell, Arizona State Univ., Tempe, AZ

10:00 **1430** The influence of nest cavity temperature on fitness and diapause incidence in the solitary bee *Megachile rotundata*. Elisabeth Wilson¹, Covey Wong¹, Claire Murphy², George Yocum³, Joseph P. Rinehart³ and **Julia Bowsher** (julia.bowsher@ndsu.edu)¹, ¹North Dakota State Univ., Fargo, ND, ²College of William and Mary, Williamsburg, VA, ³USDA - ARS, Fargo, ND

10:10 **1431** Temperature and forage effects on long-term storage of the alfalfa leafcutting bee, *Megachile rotundata*. **Mia Park** (mia.park@ndsu.edu)¹, Casey Delphia², Kevin O'Neill², Laura Burkle², Joseph P. Rinehart³, Julia Bowsher¹ and Kendra Greenlee¹, ¹North Dakota State Univ., Fargo, ND, ²Montana State Univ., Bozeman, MT, ³USDA - ARS, Fargo, ND

10:20 Break

10:30 **1432** Relationship of esterase activity and inhibition to toxicity and synergism in honey bees. **Frank Rinkevich** (frank.rinkevich@ars.usda.gov), USDA - ARS, Baton Rouge, LA

10:40 **1433** Role of potassium ion channels in the regulation of reactive oxygen species during viral infection in honey bees. **Christopher Fellows** (cfello2@lsu.edu)¹, Troy Anderson² and Daniel Swale³, ¹Louisiana State Univ. AgCenter, Baton Rouge, LA, ²Univ. of Nebraska, Lincoln, NE, ³Louisiana State Univ., Baton Rouge, LA

10:50 **1434** Delayed lethality: The effects of a widely used fungicide on honey bees (*Apis mellifera*). **Adrian Fisher II** (afishe16@asu.edu)¹, Nicole DesJardins¹, Gloria DeGrandi-Hoffman², Jennifer H. Fewell¹, Brian Smith¹, Meredith Johnson¹, Osman Kaftanoglu¹, Teddy Cogley¹ and Jon Harrison¹, ¹Arizona State Univ., Tempe, AZ, ²USDA - ARS, Tucson, AZ

11:00 **1435** Sublethal and lethal synergistic effects of a new systemic pesticide, flupyradifurone, on honey bees (*Apis mellifera*). Simone Tosi and **James C. Nieh** (jnieh@ucsd.edu), Univ. of California, La Jolla, CA

11:10 **1436** Addressing acute contact toxicity to adult orchard bees and exposure via mud. **Ana Cabrera** (ana.cabrera@bayer.com)¹, Kimberly Huntzinger¹, Nina Exeler² and Anja Quambusch², ¹Bayer Crop Science, Research Triangle Park, NC, ²Bayer Crop Science, Monheim am Rhein, Germany

11:20 **1437** Impacts of honey bee viruses, an agricultural adjuvant, and their interaction on blue orchard bee (*Osmia lignaria*) larval development. **Natalie Boyle** (natalie.boyle@ars.usda.gov)¹, Mary-Kate Williams², Ellen Klinger¹, Diana Cox-Foster¹ and Theresa Pitts-Singer¹, ¹USDA - ARS, Logan, UT, ²Utah State Univ., Logan, UT

11:30 **1438** Toxicity of some ready-to-use garden pesticides to non-*Apis* bees. **Neelendra Joshi** (nkjoshi@uark.edu)¹, Olivia Kline¹, Joseph Belsky¹ and John Adamczyk², ¹Univ. of Arkansas, Fayetteville, AR, ²USDA - ARS, Poplarville, MS

11:40 **1439** Microalgae as a promising and a sustainable solution to improve honey bee nutrition. **Vincent Ricigliano** (vincent.ricigliano@ars.usda.gov) and Michael Simone-Finstrom, USDA - ARS, Baton Rouge, LA

11:50 **1440** Disease comparison between a native bee, *Osmia lignaria*, and a managed bee, *Apis mellifera*. **Rachel Cerjan** (rcerj001@odu.edu) and Lisa Horth, Old Dominion Univ., Norfolk, VA

10-min: P-IE, Ecology, General

Room 232 (America's Center)

Moderators: George Wang¹ and Xiao-Yue Hong², ¹East Central Univ., Ada, OK, ²Nanjing Agricultural Univ., Nanjing, China

9:00 **1441** Presentation withdrawn

9:10 **1442** Arthropods in *Quercus* leaf ties respond differently to forest edge effects. **George Wang** (gwang@ecok.edu), Norbu Gurung and Cuishan Deng, East Central Univ., Ada, OK

9:20 **1443** Aspen genes underlie variation in associated herbivorous insect communities. **Clay Morrow** (morrow5@wisc.edu)¹, Jennifer Riehl¹, Christopher Cole¹, Kennedy Rubert-Nason² and Richard L. Lindroth¹, ¹Univ. of Wisconsin, Madison, WI, ²Univ. of Maine, Fort Kent, ME

9:30 **1444** The ecological apprenacy hypothesis and spatial distribution can explain colonization of *Arctostaphylos* host plants by *Tamalia* gall aphids. **Donald Miller** (dgmiller@csuchico.edu), California State Univ., Chico, CA

9:40 **1445** The role of ant seed dispersers in woody plant encroachment in arid grasslands. **Kate Mathis** (kmathis@clarku.edu), Clark Univ., Worcester, MA

Oral Presentations

9:50	1446	How often does grasshopper herbivory reduce grassland production in the northern Great Plains? David Branson (dave.branson@ars.usda.gov), USDA - ARS, Sidney, MT
10:00	1447	Aphid species specializing on milkweed have distinct symbiont communities. Laramy Enders (laramy.enders@gmail.com) ¹ , Thorsten Hansen ¹ , Kirsten Brichler ² , John Couture ¹ and Elizabeth French ¹ , ¹ Purdue Univ., West Lafayette, IN, ² Virginia Polytechnic Institute and State Univ., Blacksburg, VA
10:10	1448	A novel statistical method for estimating immature survival probability from monarch butterfly field counts. Tyler Grant (tgrant@iastate.edu) and Steven Bradbury, Iowa State Univ., Ames, IA
10:20		Break
10:30	1449	Narrow pollen diets are associated with declining Midwestern bumble bee species. Thomas Wood (thomaswood734@gmail.com) ^{1,2} , Jason Gibbs ³ , Kelsey Graham ² and Rufus Isaacs ² , ¹ Univ. de Mons, Mons, Belgium, ² Michigan State Univ., East Lansing, MI, ³ Univ. of Manitoba, Winnipeg, MB, Canada
10:40	1450	Determining the shape of the seasonal abundance curve of solitary bees. Michael Stemkovski (m.stemkovski@gmail.com), Utah State Univ., Logan, UT
10:50	1451	Presentation withdrawn
11:00	1452	Pollinator community and herbivore effects on plant seed production across elevation gradients. Paul Ode (paul.ode@colostate.edu), Colorado State Univ., Fort Collins, CO
11:10	1453	Changes in natural enemy-herbivore networks along local and landscape gradients in urban agroecosystems. Heidi Liere (lliereheid@seattleu.edu) ¹ , Azucena Lucatero ² , Peter Bichier ² , Monika Egerer ² , Brenda Lin ³ , Shalene Jha ⁴ and Stacy M. Philpott ² , ¹ Seattle Univ., Seattle, WA, ² Univ. of California, Santa Cruz, CA, ³ CSIRO, Aspendale, VIC, Australia, ⁴ Univ. of Texas, Austin, TX
11:20	1454	Thermal tolerance and predicted geographic distribution of the gloomy scale (<i>Melanaspis tenebricosa</i>). Michael Just (mjjust@ncsu.edu) and Steven Frank, North Carolina State Univ., Raleigh, NC
11:30	1455	Presentation withdrawn
11:40	1456	Population abundance and genetic diversity of the spider mite <i>Tetranychus truncatus</i> (Acar: Tetranychidae) in China. Xiao-Yue Hong (xyhong@njau.edu.cn), Nanjing Agricultural Univ., Nanjing, China
9:20	1459	The inherited bacterial symbiont <i>Hamiltonella</i> affects the sex ratio of an insect host. Hong-Wei Shan ¹ , Junbo Luan ² , Yin-Quan Liu ¹ , Angela Douglas ² and Shu-Sheng Liu (shshliu@zju.edu.cn) ¹ , ¹ Zhejiang Univ., Hangzhou, China, ² Cornell Univ., Ithaca, NY
9:30	1460	Virus-mediated expression of insecticidal proteins in maize enhances resistance to a lepidopteran pest, <i>Spodoptera frugiperda</i> . Seung Ho Chung (sc776@cornell.edu) ¹ , Mahdiyah Bigham ¹ , Yu Mei ² , Bliss Kernodle ³ , Katerina Holan ² , Steven Whitham ² and Georg Jander ¹ , ¹ Boyce Thompson Institute, Ithaca, NY, ² Iowa State Univ., Ames, IA, ³ Iowa State Univ., Grimes, IA
9:40	1461	Examining yield loss from sugarcane borer, <i>Diatraea saccharalis</i> , injury among Louisiana's commercial and experimental sugarcane cultivars. Blake Wilson (bwilson@agcenter.lsu.edu), Louisiana State Univ., Baton Rouge, LA
9:50	1462	Presentation withdrawn
10:00	1463	Effects of nitrogen fertilizer on anti-herbivore resistance in crops. Rensen Zeng (rszeng@fafu.edu.cn), YuanYuan Song and Jie Wang, Fujian Agriculture and Forestry Univ., Fuzhou, China
10:10	1464	Teasing apart plant-mediated insect-insect interactions: Defense responses, hormones, and plant stress in a declining conifer system. Chad M. Rigsby (crigsby@bartlettlab.com) ¹ , Ian G. Kinahan ² , Alex K. Baranowski ² , Claire M. Wilson ² , Robert Schaeffer ³ , Colin M. Orians ³ and Evan L. Preisser ² , ¹ Bartlett Tree Experts, Charlotte, NC, ² Univ. of Rhode Island, Kingston, RI, ³ Tufts Univ., Medford, MA
10:20	1465	Comparison of photosynthetic activity in tomato genotypes with differing levels of fatty acid desaturation and aphid resistance. Janithri Wickramanayake (janithriwick@gmail.com) and Fiona L. Goggin, Univ. of Arkansas, Fayetteville, AR
10:30	1466	<i>Rhopalosiphum maidis</i> -mediated potyvirus transmission and viral propagation in <i>Sorghum bicolor</i> . Peter Klein (pklein@ksu.edu) and C. Michael Smith, Kansas State Univ., Manhattan, KS
10:40	1467	Revealing mechanisms of heat-induced loss of wheat resistance to Hessian fly using RNA-sequencing. Liecheng Zhu (lzh@uncfsu.edu), Fayetteville State Univ., Fayetteville, NC

10-min: P-IE, Host-Plant Resistance

Room 276 (America's Center)

Moderators: Vamsi Nalam¹ and Lieceng Zhu², ¹Colorado State Univ., Fort Collins, CO, ²Fayetteville State Univ., Fayetteville, NC

9:00 **1457** New insights into host plant responses to soybean aphids. **Vamsi Nalam** (vamsi.nalam@colostate.edu)¹, Kumud Joshi², Patrick Selig² and William Pitt¹, ¹Colorado State Univ. Fort Collins, CO, ²Indiana Univ.-Purdue Univ., Fort Wayne, IN

9:10 **1458** Effects of soybean vein necrosis virus (SVNV) and soybean thrips on soybean plant productivity. **Doris Lagos-Kutz** (doris.lagos-kutz@ars.usda.gov)^{1,2}, Roger Bower^{1,2}, Michelle Pawlowski², Jaeyeong Han², Leslie Domier^{1,2} and Glen L. Hartman^{1,2}

¹USDA - ARS, Urbana, IL, ²Univ. of Illinois, Champaign, IL

9:20 **1459** The inherited bacterial symbiont *Hamiltonella* affects the sex ratio of an insect host. Hong-Wei Shan¹, Junbo Luan², Yin-Quan Liu¹, Angela Douglas² and **Shu-Sheng Liu** (shshliu@zju.edu.cn)¹, ¹Zhejiang Univ., Hangzhou, China, ²Cornell Univ., Ithaca, NY

9:30 **1460** Virus-mediated expression of insecticidal proteins in maize enhances resistance to a lepidopteran pest, *Spodoptera frugiperda*. **Seung Ho Chung** (sc776@cornell.edu)¹, Mahdiyah Bigham¹, Yu Mei², Bliss Kernodle³, Katerina Holan², Steven Whitham² and Georg Jander¹, ¹Bioce Thompson Institute, Ithaca, NY, ²Iowa State Univ., Ames, IA, ³Iowa State Univ., Grimes, IA

9:40 **1461** Examining yield loss from sugarcane borer, *Diatraea saccharalis*, injury among Louisiana's commercial and experimental sugarcane cultivars. **Blake Wilson** (bwilson@agcenter.lsu.edu), Louisiana State Univ., Baton Rouge, LA

9:50 **1462** Presentation withdrawn

10:00 **1463** Effects of nitrogen fertilizer on anti-herbivore resistance in crops. **Rensen Zeng** (rszeng@fafu.edu.cn), YuanYuan Song and Jie Wang, Fujian Agriculture and Forestry Univ., Fuzhou, China

10:10 **1464** Teasing apart plant-mediated insect-insect interactions: Defense responses, hormones, and plant stress in a declining conifer system. **Chad M. Rigsby** (crigsby@bartlettlab.com)¹, Ian G. Kinahan², Alex K. Baranowski², Claire M. Wilson², Robert Schaeffer³, Colin M. Orians³ and Evan L. Preisser², ¹Bartlett Tree Experts, Charlotte, NC, ²Univ. of Rhode Island, Kingston, RI, ³Tufts Univ., Medford, MA

10:20 **1465** Comparison of photosynthetic activity in tomato genotypes with differing levels of fatty acid desaturation and aphid resistance. **Janithri Wickramanayake** (janithriwick@gmail.com) and Fiona L. Goggin, Univ. of Arkansas, Fayetteville, AR

10:30 **1466** *Rhopalosiphum maidis*-mediated potyvirus transmission and viral propagation in *Sorghum bicolor*. **Peter Klein** (pklein@ksu.edu) and C. Michael Smith, Kansas State Univ., Manhattan, KS

10:40 **1467** Revealing mechanisms of heat-induced loss of wheat resistance to Hessian fly using RNA-sequencing. **Lieceng Zhu** (lzhu@uncfsu.edu), Fayetteville State Univ., Fayetteville, NC

10-min: P-IE, Invasive Species

Room 241 (America's Center)

Moderators: Frida Zink¹ and Judith Stahl², ¹Colorado State Univ., Fort Collins, CO, ²Univ. of California, Parlier, CA

9:00 **1468** Maintaining resilient environments: Invasive insect management through survey work. **Alexandra Hendon** (agh247@msstate.edu), JoVonn Hill and Jennifer Seltzer, Mississippi State Univ., Mississippi State, MS

9:10 **1469** Directional movement of newly-hatched spotted lanternfly nymphs and their response to shoots from insecticide-treated trees. **Chris Bergh** (cbergh@vt.edu) and Samuel Brandt, Virginia Polytechnic Institute and State Univ., Winchester, VA

9:20 **1470** Effects of spotted lanternfly feeding and waste on plant health. **Mariam Taleb** (mbt28@psu.edu) and Julie Urban, Pennsylvania State Univ., University Park, PA

9:30 **1471** Survival of the brown marmorated stink bug on different crops: Is California a special case? **Judith Stahl** (judithmstahl@berkeley.edu)¹, Davide Scaccini² and Kent Daane¹, ¹Univ. of California, Parlier, CA, ²Univ. of Padova, Legnaro, Italy

Oral Presentations

9:40 **1472** Analyzing the potential threat of the brown marmorated stink bug, *Halyomorpha halys*, to walnuts and determining if shell hardness protects almonds against *H. halys*. **Joanna Fisher** (jfisher@ucdavis.edu)¹, Jhalendra Rijal² and Frank Zalom¹, ¹Univ. of California, Davis, CA, ²Univ. of California Agriculture and Natural Resources, Modesto, CA

9:50 **1473** Optimized field sampling for larvae of spotted-wing drosophila (*Drosophila suzukii*) and insights from use in blueberry IPM programs. **Steven Van Timmeren** (vantimm2@msu.edu), Philip Fanning, Jacquelyn Albert and Rufus Isaacs, Michigan State Univ., East Lansing, MI

10:00 **1474** Assessing the risk posed by a vineyard pest complex: Where and how many? **Tyler Schartel** (tylersch@ucr.edu)¹, Matt Daugherty¹ and Gregory Simmons², ¹Univ. of California, Riverside, CA, ²USDA - APHIS, Salinas, CA

10:10 **1475** Identification and evaluation of attractants for Japanese beetle parasitoids *Tiphia vernalis* and *T. popillavora*. **Karla Addesso** (kaddesso@tnstate.edu)¹, Alicia Bray², Sourav Chakraborty², Jason Oliver¹ and Paul O'Neal¹, ¹Tennessee State Univ., McMinnville, TN, ²Central Connecticut State Univ., New Britain, CT

10:20 Break

10:30 **1476** Predicting allium leafminer (*Phytomyza gymnostoma*) emergence with degree-day accumulations and phenological observations. **Brandon Lingbeek** (bjl306@psu.edu)¹, Shelby J. Fleischer¹, Angela Corcoran¹ and Timothy Elkner², ¹Pennsylvania State Univ., University Park, PA, ²Pennsylvania State Univ., Manheim, PA

10:40 **1477** Occurrence and damage of red palm weevil, *Rhynchophorus ferrugineus* (Olivier), in China. **Li Ren** (renl@ioz.ac.cn) and Runzhi Zhang, Chinese Academy of Sciences, Beijing, China

10:50 **1478** The invasive coconut scale insect *Aspidiotus rigidus* (Reyne): A challenge to the Philippine coconut industry. **Maria Luz Sison** (mljsison1224@yahoo.com), Cris Cortaga, Melvin Dancel and Hayde Galvez, Univ. of the Philippines, Laguna, Philippines

11:00 **1479** An individual-based approach to understanding the roles of host and non-host tree abundances in invasion by forest pests. **Samuel F. Ward** (ward225@purdue.edu)¹, Andrew M. Liebhold² and Songlin Fei¹, ¹Purdue Univ., West Lafayette, IN, ²USDA - Forest Service, Morgantown, WV

11:10 **1480** Effects of disturbance on native Cerambycid species richness and potential cross-attraction of non-target species to Cerambycid pheromones. **Emily Franzen** (franzene2@xavier.edu), Clayton Traylor and Ann Ray, Xavier Univ., Cincinnati, OH

11:20 **1481** Identification of Japanese *Lymantria* species (Lepidoptera: Lymantriidae) based on PCR-RFLP analysis of the ITS2 region. **Makoto Arimoto** (arimoto@affrc.go.jp)¹ and Ren Iwaizumi², ¹National Agriculture and Food Research Organization, Tsukuba, Japan, ²Ministry of Agriculture, Forestry and Fisheries, Yokohama, Japan

11:30 **1482** A real-time PCR assay for rapid identification of *Tuta absoluta* (Lepidoptera: Gelechiidae). **Frida Zink** (frida.zink@colostate.edu)¹, Alicia Timm¹, Luke Tembrock¹, W. Braswell², Craig Bateman³ and Todd Gilligan⁴, ¹Colorado State Univ., Fort Collins, CO, ²USDA - ARS, Edinburg, TX, ³Univ. of Florida, Gainesville, FL, ⁴USDA - APHIS, Fort Collins, CO

11:40 **1483** Mississippi Bug Blues - outreach education highlights 2018–2019. Jason Sanders, Jennifer Seltzer, JoVonn Hill and **Beverly Keasler** (bkm105@mssstate.edu), Mississippi State Univ., Mississippi State, MS

10-min: P-IE, Novel Tools and Products

Room 275 (America's Center)

Moderators: Sunil Tewari¹ and Scott Williams², ¹Corteva Agriscience, Fresno, CA, ²DTN, West Lafayette, IN

9:00 1484 Sequoia® and Transform® with Isoclast™ active: A versatile pest management tool for multiple agroecosystems in the western region of the US. **Sunil Tewari** (sunil.tewari@corteva.com), Corteva Agriscience, Fresno, CA

9:10 **1485** Transform® with Isoclast™ active: A selective insecticide for management of soybean aphid in the Midwest region of the US. **Laura Campbell** (laura.campbell@corteva.com)¹ and Patricia Prasifka², ¹Corteva Agriscience, Carbondale, IL, ²Corteva Agriscience, West Fargo, ND

9:20 **1486** Effective semiochemical solutions for large-scale row crop pests. **Agenor Mafra-Neto** (agenor1@iscatech.com)¹, Rodrigo Silva¹, Rafael Borges², Jesse Saroli¹, Mehdi Shahbazi¹, Chinmay Raje¹, William Urrutia¹, Carmem Bernardi¹ and Revilee Lake¹, ¹ISCA Technologies, Inc, Riverside, CA, ²ISCA Tecnologias Ltda, Ijuí, Brazil

9:30 **1487** Inscalis™ insecticide: A new insecticide for management of sap feeding insects in vegetables and tree crops.
Teresia Nyooke (teresia.nyooke@basf.com), Siddharth Tiwari and Tommy Wofford, BASF Corporation, Research Triangle Park, NC

9:40 **1488** Isoclast™ Active (Sulfoxaflor) for the management of insect pests in specialty and row crops in the Southeast US. **Julian Golec** (julian.golec@corteva.com)¹, John Richburg², Stanley S. Royal³ and Patricia Prasifka⁴, ¹Corteva Agriscience, Fresno, CA, ²Corteva Agriscience, Headland, AL, ³Corteva Agriscience, Girard, GA, ⁴Corteva Agriscience, West Fargo, ND

9:50 **1489** HOOK™ Tuta to control tomato leafminer *Tuta absoluta* (Meyrick, 1917) (Lepidoptera: Gelechiidae). **Rafael Borges** (rafael@isca.com.br)¹, Sergio Benvenga², Rodrigo Silva³, Carmem Bernardi³, Revilee Lake³ and Agenor Mafra-Neto³, ¹ISCA Tecnologias Ltda, Ijuí, Brazil, ²INSPECTA, Descalvado, Brazil, ³ISCA Technologies, Inc, Riverside, CA

10:00 **1490** Pest control and beneficial preservation in one package? Yes please. **Christa Ellers-Kirk** (christa.kirk@basf.com), BASF Corporation, Research Triangle Park, NC

10:10 Break

10:20 **1491** Practical examples of taking pest-insect-related decision support systems to next level. **Matej Stefancic** (matej.stefancic@trapview.com)¹, Bostjan Bozic² and Mateja Stefancic¹, ¹Efos/Trapview, Hruševje, Slovenia, ²Efos/Trapview, Razdrto, Slovenia

10:30 **1492** Support and protection of berry crops by means of behavioral manipulation. **William Urrutia** (william.urrutia@iscatech.com)¹, Rodrigo Silva¹, Jesse Saroli¹, Revilee Lake¹, Carmem Bernardi¹, Agenor Mafra-Neto¹, Jimmy Klick² and Cesar Rodriguez³, ¹ISCA Technologies, Inc, Riverside, CA, ²Driscoll's, Oxnard, CA, ³Rutgers, The State Univ. of New Jersey, Chatsworth, NJ

10:40 **1493** Beetle Guard: A semiochemical repellent for ambrosia beetle pests. **Jesse Saroli** (jesse.saroli@iscatech.com)¹, Rodrigo Silva¹, Carmem Bernardi¹, Xavier Martin², Arthur Agnello³, Jason Oliver⁴, Karla Addesso⁴ and Agenor Mafra-Neto¹, ¹ISCA Technologies, Inc, Riverside, CA, ²Univ. of Florida, Quincy, FL, ³Cornell Univ., Geneva, NY, ⁴Tennessee State Univ, McMinnville, TN

Oral Presentations

9:00 **1517** Evolution of color pattern in the ladybug genus *Coccinella* (Coleoptera: Coccinellidae). **Romain Nattier** (nattier@mnhn.fr) and Marianne Elias, Muséum national d'Histoire naturelle, Paris, France

9:10 **1518** Rove beetle genomes provide insight into lineage hyperdiversification. **Sheila Kitchen** (sak3097@caltech.edu), Adrian Brückner, Yuriko Kishi, David Miller, Thomas Naragon, Julian Wagner and Joseph Parker, California Institute of Technology, Pasadena, CA

9:20 **1519** Phylogenomic analysis of the beetle suborder Adephaga confirms paraphyly of the 'Hydradephaga'. **Grey Gustafson** (tgustafson@gmail.com)¹, Stephen Baca¹, Alana Alexander² and Andrew Short¹, ¹The Univ. of Kansas, Lawrence, KS, ²Univ. of Otago, Dunedin, New Zealand

9:30 **1520** Higher-level phylogeny and reclassification of Lampyridae (Coleoptera: Elateroidea). **Gavin Martin** (gavin.jon.martin@gmail.com)¹, Kathrin Stanger-Hall², Marc Branham³, Luiz Silveira⁴, Sarah Lower⁵, David Hall², Xueyan Li⁶, Alan Lemmon⁷, Emily Lemmon⁷ and Seth M. Bybee¹, ¹Brigham Young Univ., Provo, UT, ²Univ. of Georgia, Athens, GA, ³Univ. of Florida, Gainesville, FL, ⁴Univ. Federal do Rio de Janeiro, Rio de Janeiro, Brazil, ⁵Bucknell Univ., Lewisburg, PA, ⁶Chinese Academy of Sciences, Kunming, China, ⁷Florida State Univ., Tallahassee, FL

9:40 **1521** The cerambycid, buprestid, and scolytine fauna of Minot, North Dakota: A decade of urban forest survey efforts. **Guy Hanley** (ghanley701@gmail.com), Northern Plains Entomology, Minot, ND

9:50 **1522** Evolution of Acidocerine water beetles shaped by West Gondwanan vicariance and Cenozoic isolation of South America. **Andrew Short** (aezshort@ku.edu)¹ and Emmanuel Toussaint², ¹The Univ. of Kansas, Lawrence, KS, ²Natural History Museum, Geneva, Switzerland

10:00 **1523** Phylogenomic analyses of thousands of genes resolve the phylogeny and evolution of beetles (Coleoptera). **Seungwan Shin** (sshin4@memphis.edu) and Duane McKenna, Univ. of Memphis, Memphis, TN

10:10 Break

10:20 **1524** Reconstructing global phylogeny of Asidini (Coleoptera: Tenebrionidae) one museum at a time: Using high-throughput sequencing of museum specimens to resolve relationships between rare taxa. **Kojun Kanda** (kk933@nau.edu)¹ and Aaron Smith², ¹Northern Arizona Univ., Flagstaff, AZ, ²Purdue Univ., West Lafayette, IN

10:30 **1525** Reconstructing a molecular phylogeny of subtribe Agrina Kirby in the carabid subfamily Lebiinae using historic museum specimens: Methods in successful ancient DNA extraction. **Beulah Garner** (b.garner@nhm.ac.uk), The Natural History Museum, London, United Kingdom

10:40 **1526** Combining transcriptomes, genomes, and target capture data to investigate the deep nodes of the Bembidiini (Coleoptera: Carabidae) phylogeny. **James Pflug** (pflugja@oregonstate.edu)¹, John Sproul² and David Maddison¹, ¹Oregon State Univ., Corvallis, OR, ²Univ. of Rochester, Rochester, NY

10:50 **1527** Checklist of the Elateridae (Coleoptera) of Montana, USA. **Frank Etzler** (etzler@montana.edu)¹ and Catherine Seibert², ¹Montana State Univ., Bozeman, MT, ²Woodard and Curran, Belgrade, MT

11:00 **1528** A comparative genomic approach for studying the evolution of carabid beetle defensive chemistry. **Tanya Renner** (tur158@psu.edu)¹, Adam Rork¹, Reilly McManus², Aman Gill³, Sihang Xu⁴, Kipling Will³, Athula Attygalle⁴ and Wendy Moore², ¹Pennsylvania State Univ., University Park, PA, ²Univ. of Arizona, Tucson, AZ, ³Univ. of California, Berkeley, CA, ⁴Stevens Institute of Technology, Hoboken, NJ

11:10 **1529** Morphological study of *Cerambyx* sp. eggs using the scanning electron microscope. **Wajih Alkassis** (alkassis@yahoo.fr), Damascus Univ., Damascus, Syrian Arab Republic

TUESDAY, NOVEMBER 19, 2019 • AFTERNOON

Lunch & Learn: How to Advocate for Your Publications

Room 131 (America's Center)

Moderators and Organizers: Lisa Junker¹, Ashley Kennedy²,

Michael J. Raupp³, Immo Hansen⁴ and Elizabeth Barnes⁵,

¹Entomological Society of America, Annapolis, MD, ²Univ. of Delaware, Newark, DE, ³Univ. of Maryland, College Park, MD, ⁴New Mexico State Univ., Las Cruces, NM, ⁵Purdue Univ., West Lafayette, IN

12:15 PM - 1:15 PM

Lunch & Learn: Getting Your Foot in the Door for Section Leadership Positions

Room 132 (America's Center)

Moderators and Organizers: Floyd Shockley¹ and Jennifer M.

Zaspel², ¹Smithsonian Institution, National Museum of Natural History, Washington, DC, ²Milwaukee Public Museum, Milwaukee, WI

12:15 PM - 1:15 PM

Lunch & Learn: So, You're on the Academic Job Market: Drafting Memorable Statements, Secrets from the Search Committee, and Advice from Recent Hires

Room 130 (America's Center)

Moderators and Organizers: Carly Tribull¹, Monique Rivera²,

Katelyn Kesheimer³ and Phillip Barden⁴, ¹Farmingdale State College, Farmingdale, NY, ²Univ. of California, Riverside, CA, ³Auburn Univ., Auburn, AL, ⁴American Museum of Natural History, New York, NY

12:15 PM - 1:15 PM

Workshop: Entomological Edutainment and Portal to the Public

Washington Lobby (America's Center)

Moderator and Organizer: Maddie Earnest, Saint Louis Science Center, St. Louis, MO

12:30 PM - 4:30 PM

Student Debates - Synergisms in Science: Climate Change and Integrated Pest Management (IPM) through the Lens of Communication

America's Ballroom (America's Center)

Moderators and Organizers: Jocelyn R. Holt¹, Lina Bernaola² and Kadie Britt³, ¹Texas A&M Univ., College Station, TX, ²Louisiana State Univ., Baton Rouge, LA, ³Virginia Polytechnic Institute and State Univ., Blacksburg, VA

Tuesday, November 19

Oral Presentations

1:00	1530	Introductory remarks - Synergisms in science: Climate change and integrated pest management (IPM) through the lens of communication. Jocelyn R. Holt (holtjocelyn@tamu.edu), Texas A&M Univ., College Station, TX
1:10	1531	Topic 1, Unbiased Introduction: How can scientists better communicate with the public to get them more engaged in Integrated Pest Management (IPM)? Lina Bernaola (lbernaola@agcenter.lsu.edu), Louisiana State Univ., Baton Rouge, LA
1:15	1532	Topic 1, Team 1: Virginia Tech (faculty advisor - Doug Pfieffer). Chris McCullough (ctmccull@gmail.com), Morgan Roth, Jennie Wagner and Max Ragozzino, Virginia Polytechnic Institute and State Univ., Blacksburg, VA
1:22		Cross-examination of VT by LSU2
1:25	1533	Topic 1, Team 2 Louisiana State University (LSU2): How can scientists better communicate with the public to get them more engaged in Integrated Pest Management (IPM)? (faculty advisor - Blake Wilson) Leslie Aviles (laviles@agcenter.lsu.edu), Zhilin Li, Forest Huval and Manoj Pandey, Louisiana State Univ., Baton Rouge, LA
1:32		Cross-examination of LSU2 by VT
1:35		First rebuttal by LSU2
1:38		First rebuttal by VT
1:41		Second rebuttal by LSU2
1:44		Second rebuttal by VT
1:47		Questions from judges and audience
1:57		Break
2:07	1534	Topic 2, Unbiased Introduction: What is the most influential impact of climate change on entomology? Kadie Britt (kadieb@vt.edu), Virginia Polytechnic Institute and State Univ., Blacksburg, VA
2:12	1535	Topic 2, Team 1: Washington State University (faculty advisor - David Crowder). Benjamin Lee (benjamin.w.lee@wsu.edu), Megan Asche, Abigail Hayes, Abigail Cohen and Adrian Marshall, Washington State Univ., Pullman, WA
2:19		Cross-examination of WSU by KSU
2:22	1536	Topic 2, Team 2: Kansas State University (faculty advisor - Rob Morrison). Hannah Quellhorst (hquelleho@ksu.edu), Rachel Wilkins, Jacqueline Maille and Valerie Nguyen, Kansas State Univ., Manhattan, KS
2:29		Cross-examination of KSU by WSU
2:32		First rebuttal by KSU
2:35		First rebuttal by WSU
2:38		Second rebuttal by KSU
2:41		Second rebuttal by WSU
2:44		Questions from judges and audience
2:54		Break
3:04	1537	Topic 3, Unbiased Introduction: Sustainable agriculture (such as polyculture/farmscaping/push-pull) is the best approach to farming when incorporating integrated pest management techniques (IPM). Rachel K. Skinner (rskinn2@illinois.edu), Univ. of Illinois, Champaign, IL
3:09	1538	Topic 3, Team 1: University of Florida, Purdue, Michigan State (faculty advisor - Rachel Mallinger). John Ternešt (jternešt@ufl.edu) ¹ , Sarah Anderson ¹ , Scott Gula ² , Kayleigh Hauri ³ and Julius Eason ² , ¹ Univ. of Florida, Gainesville, FL, ² Purdue Univ., West Lafayette, IN, ³ Michigan State Univ., East Lansing, MI
3:16		Cross-examination of UF, PU, MS by LSU1
3:19	1539	Topic 3, Team 2: Louisiana State University (LSU1) (faculty advisor - Blake Wilson). Megan Mulcahy (mmulca2@lsu.edu), Scott Lee, James Michael Villegas and Patricia Shorter, Louisiana State Univ., Baton Rouge, LA
3:26		Cross-examination of LSU1 by UF, PU, MS
3:29		First rebuttal by LSU1
3:32		First rebuttal by UF, PU, MS
3:35		Second rebuttal by LSU1
3:38		Second rebuttal by UF, PU, MS
3:41		Questions from judges and audience
3:51		Concluding remarks
Program Symposium: Insect Decline in the Anthropocene		
Room 223/224/225/226 (America's Center)		
Moderator and Organizer: David Wagner, Univ. of Connecticut, Storrs, CT		
1:30		Introductory remarks
1:35	1540	Where might be many tropical insects? Daniel H. Janzen (djanzen@sas.upenn.edu) and Winnie Hallwachs, Univ. of Pennsylvania, Philadelphia, PA
2:05	1541	To nurture the survivors, make them welcome. Winnie Hallwachs (whallwac@sas.upenn.edu) and Daniel H. Janzen, Univ. of Pennsylvania, Philadelphia, PA
2:20	1542	Biodiversity monitoring with malaise traps and standardized sampling design – potentials, results and experiences. Martin Sorg (msg@biota.de), Entomological Society Krefeld, Krefeld, Germany
2:35	1543	75% decline in flying insect biomass in German nature reserves: What do we know and what can be done to get them back. Hans deKroon (h.dekroon@science.ru.nl), Radboud Univ., Nijmegen, Netherlands
2:50	1544	The food web is not collapsing in the Luquillo Experimental Forest, Puerto Rico. Timothy Schowalter (tschowalter@agctr.lsu.edu) ¹ , Steve Presley ² , Robert Waide ³ , Michael Willig ² , Lawrence Woolbright ⁴ and Jess Zimmerman ⁵ , ¹ Louisiana State Univ., Baton Rouge, LA, ² Univ. of Connecticut, Storrs, CT, ³ Univ. of New Mexico, Albuquerque, NM, ⁴ Siena College, Loudonville, NY, ⁵ Univ. of Puerto Rico, Rio Piedras, Puerto Rico
3:05		Break
3:15	1545	Agriculture intensification as a threat to biodiversity. Peter Raven , Washington Univ., St. Louis, MO

Oral Presentations

3:45 **1546** Insects and recent climate change.
Matthew L. Forister (mforister@unr.edu), Univ. of Nevada, Reno, NV

4:00 **1547** The decline of butterflies in Europe: The crisis deepens. **Martin Warren** (martin.warren@bc-europe.eu), Butterfly Conservation Europe, Dorset, United Kingdom

4:30 **1548** Moth declines and what they can tell us.
David Wagner (david.wagner@uconn.edu), Univ. of Connecticut, Storrs, CT

4:45 **1549** The global pollinator crisis—delusion, decline, or death blow? **May Berenbaum** (maybe@illinois.edu), Univ. of Illinois, Champaign, IL

5:00 **1550** Current knowledge about Arctic arthropod population change and a computer vision for future monitoring.
Toke Høye (tth@bios.au.dk), Aarhus Univ., Aarhus, Denmark

5:15 **1551** The decline of insects: What should we do about it? **Akito Kawahara** (kawahara@flmnh.ufl.edu), Univ. of Florida, Gainesville, FL

Program Workshop: ComSciCon Entomology

Room 275 (America's Center)

Moderators and Organizers: Sheryl Hosler¹, Kaylee Arnold², Maxwell Helmberger³, Laura Kraft² and Madison Sankovitz⁴, ¹Univ. of Illinois, Chicago, IL, ²Univ. of Georgia, Athens, GA, ³Michigan State Univ., East Lansing, MI, ⁴Univ. of California, Riverside, CA

1:30 Introductory remarks

1:45 Workshop: Theater games

2:30 Panel: SciComm careers

3:15 Break

3:30 Panel: Multimedia SciComm

4:15 Workshop: Write-a-thon

5:00 Concluding remarks

MUVE Section Symposium: Indoor Pests and Human Health: Advocating for Interdisciplinary Interactions

Room 260 (America's Center)

Moderators and Organizers: Zachary DeVries and Coby Schal, North Carolina State Univ., Raleigh, NC

1:30 Introductory remarks

1:40 **1552** Cockroaches in human allergic disease.
Anna Pomés (apomes@inbio.com), Indoor Biotechnologies, Inc, Charlottesville, VA

1:55 **1553** Effective interventions eradicate cockroaches and reduce allergens in the home environment. **Coby Schal** (coby@ncsu.edu), Zachary DeVries and Richard Santangelo, North Carolina State Univ., Raleigh, NC

2:10 **1554** The epidemiology of indoor allergens. **Felicia Rabito** (rabito@tulane.edu), Tulane Univ., New Orleans, LA

2:25 **1555** Factors mediating persistence of *Escherichia coli* in the gut of *Blattella germanica* following oral infection. **Jose Pietri** (jose.pietri@usd.edu), Ritesh Ray and Rashaun Potts, Univ. of South Dakota School of Medicine, Vermillion, SD

2:40 **1556** Dust mites, allergens, and asthma: What's new? **Martin Chapman** (mdc@inbio.com), Indoor Biotechnologies, Inc, Charlottesville, VA

2:55 **1557** Triatomines, bed bugs, cities, states, and Chagas disease. **Michael Levy** (mzlevy@gmail.com), Perelman School of Medicine, Philadelphia, PA

3:10 Break

3:25 **1558** A clinician's perspective on the bed bug problem. **Johnathan Sheele** (jsheele@gmail.com), Mayo Clinic, Jacksonville, FL

3:40 **1559** Bed bugs and mental health. **Stéphane Perron** (stephane.perron@inspq.qc.ca), Institut national de santé publique du Québec, Montréal, QC, Canada

3:55 **1560** Bed bugs, histamine, and human health.
Zachary DeVries (zcdevrie@ncsu.edu), Richard Santangelo and Coby Schal, North Carolina State Univ., Raleigh, NC

4:10 **1561** Interventions to reduce bed bug infestations in low-income homes. **Richard Cooper** (rick.cooper@cooperpest.com)¹ and Changlu Wang², ¹Terminix, Lawrenceville, NJ, ²Rutgers, The State Univ. of New Jersey, New Brunswick, NJ

4:25 **1562** Urban pest ordinances and regulations: A view from St. Louis. **Fredrick Echols** (turnerm@stlouis-mo.gov), City of St. Louis Dept. of Health, St. Louis, MO

4:40 **1563** The need for improved pest control in HUD-assisted housing. **Peter Ashley** (peter.j.ashley@hud.gov), US Dept. of Housing and Urban Development, Washington, DC

4:55 Panel discussion

PBT Section Symposium: Mechanisms of Chemical Adaptation to Support Pest and Pollinator Management

Room 266 (America's Center)

Moderators and Organizers: Fang Zhu and Timothy Moural, Pennsylvania State Univ., University Park, PA

1:30 Introductory remarks

1:30 **1564** Cytochrome P450-based metabolic resistance in *Anopheles* and *Aedes* mosquito vectors. **John Vontas** (vontas@imbb.forth.gr), Forth Institute of Molecular Biology and Biotechnology, Heraklio, Greece

2:00 **1565** RNA interference of NADPH-Cytochrome P450 reductase increases susceptibilities to multiple acaricides in *Tetranychus urticae*. **Adekuunle Adesanya** (adekuunle.adesanya@wsu.edu)¹, Doug Walsh², Laura Lavine¹ and Fang (Rose) Zhu¹, ¹Washington State Univ., Pullman, WA, ²Washington State Univ., Prosser, WA

2:30 **1566** Characterization of synergistic toxicity in a fungicide-insecticide combination in honey bees. **Emily Walker** (walker.2100@osu.edu)¹, Reed Johnson¹ and Ryan Arvidson², ¹The Ohio State Univ., Wooster, OH, ²The College of Wooster, Wooster, OH

2:45 **1567** Olfactory chemistry in mosquito and bed bug. **Nannan Liu** (liunann@auburn.edu), Zhou Chen and Feng Chen, Auburn Univ., Auburn, AL

3:00 **1568** Impacts of in-hive pesticides on bee health. **Troy Anderson** (tanderson44@unl.edu), Univ. of Nebraska, Lincoln, NE

3:15 Break

Oral Presentations

3:25 **1569** A novel mechanism conferring strong coumaphos resistance in *Varroa destructor*. **Thomas van Leeuwen** (t.b.s.vanleeuwen@uva.nl)¹, Vlogiannitis Spyros², Mavridis Konstantinos³, Dermauw Wannes¹, Snoeck Simon¹, Katsavou Eva², Morou Evangelia², Harizanis Paschalidis², Swevers Luc⁴ and John Vontas², ¹Ghent Univ., Ghent, Belgium, ²Agricultural Univ. of Athens, Athens, Greece, ³Forth Institute of Molecular Biology and Biotechnology, Heraklio, Greece, ⁴National Centre for Scientific Research 'Demokritos', Athens, Greece

3:55 **1570** Bee chemical adaptation to host allelochemicals. **Chris Bass** (c.bass@exeter.ac.uk)¹ and Ralf Nauen², ¹Univ. of Exeter, Penryn, United Kingdom, ²Bayer Crop Science, Monheim am Rhein, Germany

4:25 **1571** P450-mediated detoxification of xenobiotic chemicals in *Helicoverpa* and *Spodoptera* caterpillars. **Yidong Wu** (wyd@njau.edu.cn), Yu Shi, Huidong Wang, Yayun Zuo and Yihua Yang, Nanjing Agricultural Univ., Nanjing, China

4:40 **1572** Mechanisms of comparative pesticide toxicities in bees. **Timothy Moural** (twm78@psu.edu)¹, Ngoc Phan¹, Edwin Rajotte², David Biddinger³ and Fang Zhu⁴, ¹Pennsylvania State Univ., University Park, PA, ²Pennsylvania State Univ., University Park, PA, ³Pennsylvania State Univ. Fruit Research and Extension Center, Biglerville, PA

4:55 **SP1573** Regulation of xenobiotic detoxification in *Lymantria dispar*. **Fang Zhu** (fuz59@psu.edu)¹, Timothy Moural¹ and Chuanwang Cao², ¹Pennsylvania State Univ., University Park, PA, ²Northeast Forestry Univ., Haibin, China

5:05 **1574** Phenylacetonitrile mediated antipredator defense in locusts. **Le Kang** (lkang@ioz.ac.cn), Chinese Academy of Sciences, Beijing, China

5:20 Concluding remarks

2:35 **1579** Vip4Ba1, a new Bt insecticidal protein for CRW control. **Yong Yin** (yong.yin@bayer.com)¹, Karrie Buckman², Jean-Louis Kouadio¹, Brent Werner¹ and Meiying Zheng¹, ¹Bayer Crop Science, Chesterfield, MO, ²Bayer Crop Science, Waterman, IL

2:50 **1580** CRW-actives from non-Bt bacteria and plants. **Jennifer Barry** (jennifer.barry@pioneer.com), Corteva Agriscience, Johnston, IA

3:05 **1581** A new hemipteran-active protein from Bt. **James Roberts** (james.roberts1@bayer.com), David Bowen, Jean-Louis Kouadio, Waseem Akbar and Aqeel Ahmad, Bayer Crop Science, Chesterfield, MO

3:20 Break

3:35 **1582** Domain-based specificity of *Clostridium perfringens* Epsilon toxin. **Mark McClain** (mark.s.mcclain@vanderbilt.edu), Vanderbilt Univ. Medical Center, Nashville, TN

3:50 **1583** Mechanistic insights into the first Lygus-active beta-pore forming protein. **Agoston Jerga** (agoston.jerga@bayer.com), Bayer Crop Science, Chesterfield, MO

4:05 **1584** Retargeting of Vip3 protein for novel insecticidal spectrum. **Shravan Sukumar** (shravan.sukumar@corteva.com)¹, Marc Zack², Megan Sopko¹, Meghan Frey³, Janna Armstrong⁴, Scott Bevan⁵, William Moskal⁶, Jennifer M. Arruda¹, Ted J. Letherer¹, Sek Yee Tan⁷, James Hasler¹ and Ken Narva⁸, ¹Corteva Agriscience, Indianapolis, IN, ²Genective, Zionsville, IN, ³10X Genomics, Livermore, CA, ⁴Seattle Childrens Research Institute, Seattle, WA, ⁵Inari, Lafayette, IN, ⁶Saw-whet Farms, Thorntown, IN, ⁷Bayer Crop Science, West Sacramento, CA, ⁸GreenLight Biosciences, Durham, NC

4:20 **1585** Characterizing the environmental safety of IPD072Aa protein. **Kristine Sturtz** (kristine.sturtz@corteva.com), Chad Boeckman and Jennifer Anderson, Corteva Agriscience,

PBT Section Symposium: New Insecticidal Proteins: Novel Methods for Discovery and Characterization

Room 267 (America's Center)

Moderators and Organizers: William Moar¹, Mark Nelson² and Kara Giddings¹, ¹Bayer Crop Science, Chesterfield, MO, ²Corteva Agriscience, Johnston, IA

1:30 Introductory remarks

1:35 **1575** Discovery of new insecticidal traits at AgBiome
Vadim Beilinson (v.beilinson@agbiome.com), AgBiome, Research
Triangle Park, NC

1:50 **1576** Another approach to discover novel insecticidal proteins, a case study for GNIP1Aa. **Jelena Zaitseva** (jelena.zaitseva@agro.bASF-se.com), BASF Agricultural Solutions, Morrisville NC

2:05 **1577** Discovery of a western corn rootworm-active protein from *Brevibacillus laterosporus*. **David Bowen** (david.bowen@bayer.com), James Roberts, Jean-Louis Kouadio and Werner, Bayer Crop Science, Chesterfield, MO

2:20 **1578** IPD072Aa from *Pseudomonas chlororaphis* for control of western corn rootworm, *Diabrotica virgifera virgifera* (LeConte). **Mark Nelson** (mark.e.nelson@corteva.com)¹, Nuria Juarez¹, Claudia Ortega¹, Heather Pence², Andrew Bowling² and Albert Lu¹, ¹Corteva Agriscience, Johnston, IA, ²Corteva Agriscience Indianapolis, IN

3:35 **1579** Vip4Ba1, a new Bt insecticidal protein for CRW control. **Yong Yin** (yong.yin@bayer.com)¹, Karrie Buckman², Jean-Louis Kouadio¹, Brent Werner¹ and Meiying Zheng¹, ¹Bayer Crop Science, Chesterfield, MO, ²Bayer Crop Science, Waterman, IL

2:50 **1580** CRW-actives from non-Bt bacteria and plants. **Jennifer Barry** (jennifer.barry@pioneer.com), Corteva Agriscience, Johnston, IA

3:05 **1581** A new hemipteran-active protein from Bt. **James Roberts** (james.roberts1@bayer.com), David Bowen, Jean-Louis Kouadio, Waseem Akbar and Aqeel Ahmad, Bayer Crop Science, Chesterfield, MO

3:20 Break

3:35 **1582** Domain-based specificity of *Clostridium perfringens* Epsilon toxin. **Mark McClain** (mark.s.mcclain@vanderbilt.edu), Vanderbilt Univ. Medical Center, Nashville, TN

3:50 **1583** Mechanistic insights into the first Lygus-active beta-pore forming protein. **Agoston Jerga** (agoston.jerga@bayer.com), Bayer Crop Science, Chesterfield, MO

4:05 **1584** Retargeting of Vip3 protein for novel insecticidal spectrum. **Shravan Sukumar** (shravan.sukumar@corteva.com)¹, Marc Zack², Megan Sopko¹, Meghan Frey³, Janna Armstrong⁴, Scott Bevan⁵, William Moskal⁶, Jennifer M. Arruda¹, Ted J. Letherer¹, Sek Yee Tan⁷, James Hasler¹ and Ken Narva⁸, ¹Corteva Agriscience, Indianapolis, IN, ²Genective, Zionsville, IN, ³10X Genomics, Livermore, CA, ⁴Seattle Childrens Research Institute, Seattle, WA, ⁵Inari, Lafayette, IN, ⁶Saw-whet Farms, Thorntown, IN, ⁷Bayer Crop Science, West Sacramento, CA, ⁸GreenLight Biosciences, Durham, NC

4:20 **1585** Characterizing the environmental safety of IPD072Aa protein. **Kristine Sturtz** (kristine.sturtz@corteva.com), Chad Boeckman and Jennifer Anderson, Corteva Agriscience, Johnston, IA

4:35 **2349** Structure of Vip1 protein and insights into insect specificity. **Colin Berry** (berry@cf.ac.uk), D. Dafydd Jones and Husam Al-Maslookhi, Cardiff Univ., Cardiff, United Kingdom

4:50 Concluding remarks

P-IE Section Symposium: Advocating for Coexistence of IRM and IPM

Room 242 (America's Center)

Moderators and Organizers: Graham P. Head¹, Caydee Savinelli², Tony Burd³, Adrian Duehl⁴, John Immaraju⁵, Scott Ludwig⁶, Hector E. Portillo⁷ and Diane Reynolds⁸, ¹Bayer Crop Science, St. Louis, MO, ²Syngenta Plant Protection, Greensboro, NC, ³Syngenta Crop Protection, Greensboro, NC, ⁴Bayer Crop Science, Research Triangle Park, NC, ⁵AMVAC Chemical Corporation, Newport Beach, CA, ⁶AMVAC Chemical Corporation, Arp, TX, ⁷FMC Agricultural Solutions, Newark, DE, ⁸ADAMA, Raleigh, NC

1:30 Introductory remarks

1:45 **1586** Bt resistance by western corn rootworm and the potential for IPM to delay resistance. **Aaron J. Gassmann** (aaronjg@iastate.edu), Iowa State Univ., Ames, IA

2:15 **1587** Dreaming the impossible dream? Reimagining IPM for sporadic pests of seedling crops **Thomas Sappington** (tom.sappington@ars.usda.gov)¹, Louis Hesler², K. Clint Allen³ and Sharon Papiernik², ¹USDA - ARS, Ames, IA, ²USDA - ARS, Ames, IA, ³USDA - ARS, Beltsville, MD

Oral Presentations

2:30 **1588** Governance options for managing pest resistance. **Steven Bradbury** (spbrad@iastate.edu), Iowa State Univ., Ames, IA

2:45 **1589** Why IPM vs. IRM are occasionally mutually exclusive and what to do about it. **Christian Krupke** (ckrupke@purdue.edu), Purdue Univ., West Lafayette, IN

3:00 **1590** Slugs as a motivating force for IPM in no-till crop production. **John Tooker** (tookern@psu.edu), Pennsylvania State Univ., University Park, PA

3:15 Panel discussion - first group of 5 presenters

3:30 Break

3:45 **1591** Management of brown marmorated stink bug, *Halyomorpha halys*, and integrated pest management in fruit. **Greg Krawczyk** (gkx13@psu.edu)¹, Hillary Peterson² and Deonna C. Soergel¹, ¹Pennsylvania State Univ., Biglerville, PA, ²Pennsylvania State Univ., University Park, PA

4:00 **1592** Reconciling the philosophical and practical aspects of insect resistance management. **Scott Stewart** (sdstewart@utk.edu), Univ. of Tennessee, Jackson, TN

4:15 **1593** Coexistence of prophylactic insecticide use and IPM: A case study from southeastern US wheat. **Dominic Reisig** (ddreisig@ncsu.edu), North Carolina State Univ., Plymouth, NC

4:30 **1594** Developing IRM in an IPM framework in the Gulf Coast region. **Silvana Paula-Moraes** (paula.moraes@ufl.edu), Univ. of Florida, Jay, FL

4:45 **1595** IPM, IRM, and regulatory policy: Principles versus obligations. **Don Parker** (dparker@cotton.org), National Cotton Council, Cordova, TN

5:00 **1596** Theory and practice of insecticide treatment decisions in fresh market sweet corn. **Julien Beuzelin** (jbeuzelin@ufl.edu)¹, Gregg Nuessly¹ and Dakshina Seal², ¹Univ. of Florida, Belle Glade, FL, ²Univ. of Florida, Homestead, FL

5:15 Panel discussion - second group of 6 presenters

P-IE Section Symposium: Advocating for IPM in a Dynamic Agricultural World

Room 241 (America's Center)

Moderators and Organizers: Heather Leach¹ and Ashley Leach², ¹Pennsylvania State Univ., University Park, PA, ²Cornell Univ., Geneva, NY

1:30 Welcoming remarks

1:45 **1597** IPM challenges from a vegetable crops perspective. **Thomas Kuhar** (tkuhar@vt.edu), Virginia Polytechnic Institute and State Univ., Blacksburg, VA

2:00 **1598** Emergence of new technologies as part of an integrated pest management system against *Drosophila suzukii*. Gabriella Tait¹, Marco Valerio Stacconi², Serhan Mermer³, Ferdinand Pfab⁴, Linda Brewer⁵, Clive Kaiser⁶, Rachele Nieri³ and **Vaughn Walton** (vaughn.walton@oregonstate.edu)³, ¹Udine Univ., Udine, Italy, ²Fondazione Edmund Mach, San Michele all'Adige, Italy, ³Oregon State Univ., Corvallis, OR, ⁴Trento Univ., Trento, Italy, ⁵Oregon State Univ., Milton Freewater, OR

2:15 **1599** Developing applied IPM research and extension programming for *Drosophila suzukii* in Michigan tart cherries. **Nikki Rothwell** (rothwel3@msu.edu)¹, Emily Pochubay² and Karen Powers¹, ¹Michigan State Univ., Traverse City, MI, ²Michigan State Univ. Extension, Traverse City, MI

2:30 **1600** Seed treatments and Bt toxins – balancing crop protection and insecticide susceptibility. **Sally Taylor** (svtaylor@vt.edu)¹ and Christian Krupke², ¹Virginia Polytechnic Institute and State Univ., Suffolk, VA, ²Purdue Univ., West Lafayette, IN

2:45 **1601** Finally...effective host plant resistance for Lepidoptera and Coleoptera! **Anthony Shelton** (ams5@cornell.edu), Cornell Univ., Geneva, NY

3:00 **1602** Bt crops and biological control: Can they work together in IPM? **Steven Naranjo** (steve.naranjo@ars.usda.gov)¹, Jörg Romeis², Anthony Shelton³ and Peter Ellsworth⁴, ¹USDA - ARS, Maricopa, AZ, ²Agroscope, Zürich, Switzerland, ³Cornell Univ., Geneva, NY, ⁴Univ. of Arizona, Maricopa, AZ

3:15 **1603** Can we afford to stop IPM after harvest? Farm to Fork IPM programs to improve the sustainability of pest management for the entire agricultural supply chain. **William Morrison** (william.morrison@ars.usda.gov)¹, Rachel Wilkins², Hannah Quellhorst², Robert Grosdidier² and Chloe Albin², ¹USDA - ARS, Manhattan, KS, ²Kansas State Univ., Manhattan, KS

3:30 Break

3:45 **1604** Healthy agroecosystems for both IPM and food security. **Casey Hoy** (hoy.1@osu.edu), The Ohio State Univ., Wooster, OH

4:00 **1605** IPM packages for smallholder farmers: How the IPM Innovation Lab helps achieve food security in developing countries. **Amer Fayad** (afayadi@vt.edu), Virginia Polytechnic Institute and State Univ., Blacksburg, VA

4:15 **1606** IPM approaches for developing and developed nations. **Rangaswamy Muniappan** (rmuni@vt.edu), Virginia Polytechnic Institute and State Univ., Blacksburg, VA

4:30 **1607** Industry's role in advancing programs and advocating for IPM globally. **Melissa Siebert** (melissa.siebert@corteva.com)¹, Luis Gomez², John A. Wiles³ and Clint Pilcher⁴, ¹Corteva Agriscience, Greenville, MS, ²Corteva Agriscience, Carmel, IN, ³Corteva Agriscience, Stevenage, United Kingdom, ⁴Corteva Agriscience, Johnston, IA

4:45 **1608** Improving IPM adoption through clientele collaboration in applied ecology. **Jeffrey Bradshaw** (jbradshaw2@unl.edu)¹, Julie Peterson², Robert Wright³, Thomas Hunt⁴ and Justin McMechan³, ¹Univ. of Nebraska, Scottsbluff, NE, ²Univ. of Nebraska, North Platte, NE, ³Univ. of Nebraska, Lincoln, NE, ⁴Univ. of Nebraska, Concord, NE

5:00 **1609** Progress and challenges in communicating resistance management as a key component of IPM. **Julie Peterson** (julie.peterson@unl.edu)¹, Jeffrey Bradshaw², Thomas Hoegemeyer³, Roger Elmore³ and Robert Wright³, ¹Univ. of Nebraska, North Platte, NE, ²Univ. of Nebraska, Scottsbluff, NE, ³Univ. of Nebraska, Lincoln, NE

5:15 **1610** Redefining IPM for the 21st century for economic viability, environmental safety, and social acceptability. **Surendra K. Dara** (skdara@ucdavis.edu), Univ. of California Cooperative Extension, San Luis Obispo, CA

Tuesday, November 19

Oral Presentations

4:40 **1633** Closer to the edge: Climate change-driven range losses among bumblebee species to accelerate despite variation in dispersal rates. **Catherine Sirois-Delisle** (csiroisd@uottawa.ca) and Jeremy Kerr, Univ. of Ottawa, Ottawa, ON, Canada

4:55 **SP1634** The message in the buzz: Use of acoustic monitoring to track phenological mismatches between resource availability and activity of wild bumble bees. **Candace Galen** (galenc@missouri.edu)¹, Nicole Miller-Struttmann², Zachary Miller¹, David Heise³, Johannes Schul¹, Anton Gradišek⁴ and Ellie Harrison⁵, ¹Univ. of Missouri, Columbia, MO, ²Webster Univ., St. Louis, MO, ³Lincoln Univ., Jefferson City, MO, ⁴Institut Jožef Stefan, Ljubljana, Slovenia, ⁵Colorado State Univ., St. Louis, MO

5:05 **1635** Strategic habitat conservation for the imperiled monarch butterfly. **Wayne Thogmartin** (wthogmartin@usgs.gov), US Geological Survey, La Crosse, WI

P-IE Section Symposium: Using Integrated Observational, Mechanistic, and Experimental Research Approaches to Drive Conservation Decisions: Lessons from Butterfly Species in Peril

Room 262 (America's Center)

Moderators and Organizers: Kelsey E. Fisher¹ and Victoria Pocius², ¹Iowa State Univ., Ames, IA, ²Pennsylvania State Univ., University Park, PA

1:30 Welcoming remarks

1:40 **1636** Getting the most out of field surveys: How method selection impacts butterfly survey data. **Katherine Kral-O'Brien** (katherine.kral@ndsu.edu), Adrienne Antonsen, Torre Hovick and Jason Harmon, North Dakota State Univ., Fargo, ND

1:55 **1637** Influence of herbivore-type on flower and butterfly abundance in former-CRP fields managed with patch-burn grazing. **Jasmine Cutter** (jasmine.cutter@ndsu.edu)¹, Torre Hovick¹, Benjamin Geaumont², Devan McGranahan¹, Jason Harmon¹ and Ryan Limb¹, ¹North Dakota State Univ., Fargo, ND, ²North Dakota State Univ., Hettinger, ND

2:10 **1638** Developing successful disturbance-based management for at-risk butterflies. **Erica Henry** (eheeny@ncsu.edu)¹, Martha Burford Reiskind¹, Megan Tait¹ and Nick Haddad², ¹North Carolina State Univ., Raleigh, NC, ²Michigan State Univ., Hickory Corners, MI

2:25 **1639** Monarch and regal fritillary behaviors in grasslands with restored disturbance regimes. **Brooke Karasch** (brooke.karasch@ndsu.edu), Torre Hovick, Jason Harmon, Ryan Limb and Kevin Sedivec, North Dakota State Univ., Fargo, ND

2:40 **1640** Predation, disturbance, and monarch butterfly conservation. **Nathan Haan** (haannath@msu.edu), Andrew Myers, Sara Hermann and Douglas A. Landis, Michigan State Univ., East Lansing, MI

2:55 **1641** Species interactions in a changing environment: Plants, butterflies, and ants. **Rachael Bonoan** (rachael.bonoan@tufts.edu)¹, Hanna Brush¹, Elizabeth Crone¹ and Cheryl Schultz², ¹Tufts Univ., Medford, MA, ²Washington State Univ., Vancouver, WA

3:10 Break

3:20 **1642** Host plants and nectar plants: How are butterflies responding and what are they using? **Adrienne Antonsen** (adrienne.antonsen@ndsu.edu), Jason Harmon, Chyna Pei and Torre Hovick, North Dakota State Univ., Fargo, ND

3:35 **1643** You are what you eat: Survival, size and flight energetics of monarch butterflies reared on different milkweed species. **Victoria Pocius** (vxp96@psu.edu), Ruud Schilder and Jared Ali, Pennsylvania State Univ., University Park, PA

3:50 **1644** Non-native milkweed increases monarch's disease risk and depresses its population size. **Ania Majewska** (majewska.ania@gmail.com)¹, Sonia Altizer² and Richard Hall², ¹Emory Univ., Druid Hills, GA, ²Univ. of Georgia, Athens, GA

4:05 **1645** Evaluating non-target effects of herbicides on Zerene fritillary (*Speyeria zerene zerene*), a surrogate for Oregon silverspot (*Speyeria zerene hippolyta*). **Cassandra Doll** (cassandra.doll@wsu.edu)¹, Sarah Converse² and Cheryl Schultz¹, ¹Washington State Univ., Vancouver, WA, ²US Geological Survey, Seattle, WA

4:20 **1646** Understanding demography of western monarchs in winter to inform conservation. **Cameron Thomas** (cameron.thomas@wsu.edu)¹, Cheryl Schultz¹, A. Marm Kilpatrick² and Elizabeth Crone³, ¹Washington State Univ., Vancouver, WA, ²Univ. of California, Santa Cruz, CA, ³Tufts Univ., Medford, MA

4:35 **1647** Standing genetic variation in monarch butterflies and its conservation implications. **Micah Freedman** (mfreedman@ucdavis.edu)¹, William Hemstrom¹, Michael Miller¹, Myron Zalucki², Santiago Ramírez¹ and Sharon Freedman¹, ¹Univ. of California, Davis, CA, ²Univ. of Queensland, Brisbane, QLD, Australia

4:50 Discussion

5:20 Concluding remarks

SysEB Section Symposium: Bugs in Technicolor: How Color Research Advocates for Entomology

Room 230 (America's Center)

Moderators and Organizers: Amanda Whispell¹ and Melissa Sanchez Herrera², ¹Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, ²Rutgers, The State Univ. of New Jersey, Newark, NJ

1:30 Introductory remarks

1:45 **1648** Andean altitudinal depressions promote color polymorphism in the spinybacked spider. **Fabian Salgado** (fcsalgador@gmail.com), Univ. del Rosario, Bogota, Colombia

2:00 **1649** Sex and deception: Exploring the role of sensory exploitation in the courtship display of the pantropical jumping spider (*Plexippus paykulli*). **Ellen Humbel** (ehumbel@ufl.edu), Rebecca T. Kimball and Lisa Taylor, Univ. of Florida, Gainesville, FL

2:15 **1650** Blood-related prey-odor primes females to attend to red in both foraging and mate choice contexts in a mosquito-specialist jumping spider. **Lisa Taylor** (lisa.taylor@ufl.edu)¹, Fiona Cross¹ and Robert Jackson², ¹Univ. of Florida, Gainesville, FL, ²Univ. of Canterbury, Christchurch, New Caledonia

2:30 **1651** From fulgorids to football helmets: Color and vision in insects for science outreach. **Nathan Lord** (nlord@lsu.edu), Louisiana State Univ., Baton Rouge, LA

2:45 **1652** Cleaning up with insect outreach. **Kendra Abbott** (kendra@abbottnature.com), Univ. of Alabama, Tuscaloosa, AL; Arthropod Apothecary, Gordo, AL

3:00 **1653** Vibrant coloration and insect galls. **Carol Mapes** (mapes@kutztown.edu), Kutztown Univ. of Pennsylvania, Kutztown, PA

3:15 Break

Oral Presentations

3:30 Exhibit: Bugs in technicolor

3:45 **1654** Color change and thermoregulation in the blue fronted dancer damselfly (Odonata: Zygoptera). **Amanda Whispell** (amanda.whispell@rutgers.edu) and Michael L. May, Rutgers, The State Univ. of New Jersey, New Brunswick, NJ

4:00 **1655** Wing color evolution in a highly neotropical polymorphic damselfly. **Melissa Sanchez Herrera** (melsanc@gmail.com), Univ. del Rosario, Bogota, Colombia

4:15 **1656** Continuous variation of scale ultrastructure in two *Heliconius* mimics. **Juan Enciso** (juandenciso14@gmail.com), Univ. of Sheffield, Sheffield, United Kingdom

4:30 **1657** Evolution on the wing: The elaborate coloration of the polythore damselflies (Odonata: Zygoptera). **Christopher Beatty** (beattych@yahoo.com)¹, Esther Appeal², Paula Dieck², Alexander Kovalev², Melissa Sanchez Herrera³ and Stanislav Gorb⁴, ¹Cornell Univ., Ithaca, NY, ²Kiel Univ., Kiel, Germany, ³Rutgers, The State Univ. of New Jersey, Newark, NJ, ⁴Christian-Albrechts-Univ., Kiel, Germany

4:45 **1658** Jewels of iridescence: Mechanisms of structural color and implications for taxonomy. **Able Chow** (ablechow@ufl.edu), Louisiana State Univ., Baton Rouge, LA

5:00 Discussion

5:15 Concluding remarks

Member Symposium: Emerging Topics in Honey Bee Research: Growing Needs to Communicate and Advocate for Research-Based Information

Room 231 (America's Center)

Moderators and Organizers: Jennifer M. Tsuruda¹ and Julianne Rangel², ¹Univ. of Tennessee, Knoxville, TN, ²Texas A&M Univ., College Station, TX

1:30		Welcoming remarks
1:35	1659	Bees: Found in translation. Jay Evans (jay.evans@ars.usda.gov), USDA - ARS, Beltsville, MD
2:05	1660	Say what?! The highs and lows of communicating science to beekeepers. Kirsten Traynor (kstraynor@gmail.com), Arizona State Univ., Tempe, AZ
2:20	1661	Novel markers for honey bee selection and breeding. Stephen Pernal (steve.pernal@agr.gc.ca) ¹ , Renata Borba ¹ , Shelley Hoover ² , Rob Currie ³ , Marta Guarna ¹ , Amro Zayed ⁴ and Leonard Foster ⁵ , ¹ Agriculture and Agri-Food Canada Beaverlodge, AB, Canada, ² Alberta Agriculture and Forestry, Lethbridge, AB, Canada, ³ Univ. of Manitoba, Winnipeg, MB, Canada, ⁴ York Univ., Toronto, ON, Canada, ⁵ The Univ. of British Columbia, Vancouver, BC, Canada
2:35	1662	Effects of "bee-safe" pesticides applied during almond bloom on developing queens. Chia Hua-Lin (lin.724@ohio.edu) and Reed Johnson, The Ohio State Univ., Wooster, OH
2:50	1663	Presentation withdrawn
3:05	1664	Is the brood pattern within a honey bee colony a reliable indicator of queen quality? Katie Lee (leek1444@umn.edu) ¹ , Michael Gobliirsch ¹ , Erin McDermott ² , David Tarpy ² and Ma Spivak ¹ , ¹ Univ. of Minnesota, St. Paul, MN, ² North Carolina State Univ., Raleigh, NC
3:20		Break

3:35 **1665** The Bee Informed Partnership – supplying, and advocating, research-based information in order to promote healthier honey bee colonies. **Geoffrey Williams** (grw0010@auburn.edu)¹, Nathalie Steinhauer², Karen Rennich² and Dennis vanEngelsdorp²,
¹Auburn Univ., Auburn, AL, ²Univ. of Maryland, College Park, MD

4:05 **1666** Apivectoring: Challenging the way we think about pest management. **Elina Niño** (elnino@ucdavis.edu), Univ. of California, Davis, CA

4:20 **1667** Using honey bee (*Apis mellifera*) foraging preferences to understand their nutritional needs. **Pierre Lau** (plau0168@tamu.edu)¹, Vaughn Bryant¹, James Ellis², Zachary Y. Huang³, Joseph Sullivan⁴, Daniel Schmehl⁵, Ana Cabrera⁶ and Juliana Rangel¹, ¹Texas A&M Univ., College Station, TX, ²Univ. of Florida, Gainesville, FL, ³Michigan State Univ., East Lansing, MI, ⁴Ardea Consulting, Woodland, CA, ⁵Bayer Crop Science, Chesterfield, MO, ⁶Bayer Crop Science, Research Triangle Park, NC

4:35 **1668** Modern Beekeeping: The challenges beekeepers face today from an apiary inspector's perspective. **Mary Reed** (mary.reed@tamu.edu), Texas A&M Univ., College Station, TX

4:50 **1669** How scientists can help beekeepers make the right decisions (and make "good" decisions, when there is no clear right and wrong). **Bob Sears** (rob.t.sears@gmail.com), Eastern Missouri Beekeepers Association, St. Louis, MO

5:05 1670 Mosquito abatement and beekeeping - challenges and potential. **Jennifer M. Tsuruda** (jtsuruda@utk.edu), Univ. of Tennessee, Knoxville, TN

5:20 Concluding remark

Member Symposium: Entomological Bycatch: Plenty to Advocate For

Room 265 (America's Center)

Moderators and Organizers: Louis Hesler¹ and Chris Looney²,
¹USDA - ARS, Brookings, SD, ²Washington State Dept. of
Agriculture, Olympia, WA

1:30 **1671** Issues with entomological bycatch in need of advocacy. **Louis Hesler** (louis.hesler@usda.gov), USDA - ARS, Brookings, SD

1:35 **1672** Slaughter becomes science: How entomologists use bycatch. **Chris Looney** (clooney@agr.wa.gov)¹, Angela Yoder¹ and Lori Spears², ¹Washington State Dept. of Agriculture, Olympia, WA, ²Utah State Univ., Logan, UT

1:45 **1673** Ethical considerations of insect bycatch. **Bob Fischer** (fischer@txstate.edu), Texas State Univ., San Marcos, TX

2:00 **1674** Bee bycatch in different moth trap technologies. **Lori Spears** (lori.spears@usu.edu)¹, Todd M. Gilligan² and Chris Looney³. ¹Utah State Univ., Logan, UT, ²USDA - APHIS, Fort Collins, CO, ³Washington State Dept. of Agriculture, Olympia, WA

2:15 **1675** Expanding basic entomological knowledge using mosquito surveillance bycatch. **Lawrence Hribar** (lhrivar@keysmosquito.org), Florida Keys Mosquito Control District, Marathon, FL

2:30 **1676** Two for one? The drawbacks and benefits of studying disease vectors collected in broad surveys. **Phillip Shults** (ptshults@tamu.edu), Texas A&M Univ., College Station, TX

2:45 Brea

Oral Presentations

3:00 **1677** Using bycatch from pest surveys to answer questions about landscape ecology of bumble bees and ground beetles. **Maya Evenden** (mavenden@ualberta.ca), Nicholas Grocock and Maggie MacDonald, Univ. of Alberta, Edmonton, AB, Canada

3:15 **1678** Exploring the landscape ecology of bumble bees in agroecosystems using bycatch. **Morgan Christman** (morgan.christman@aggiemail.usu.edu), Lori Spears and Ricardo Ramirez, Utah State Univ., Logan, UT

3:30 **1679** Using insect survey bycatch to expose undergraduate students to arthropod biodiversity and research. **Derek Rosenberger** (dwrosenberger@olivet.edu)¹ and Brian Aukema², ¹Olivet Nazarene Univ., Bourbonnais, IL, ²Univ. of Minnesota, St. Paul, MN

3:45 **1680** Overwhelming: The quantity and research potential of residues. **Michael Ferro** (spongymesophyll@gmail.com), Clemson Univ., Clemson, SC

4:00 **1681** Digitizing 100 years of dry bycatch at the Cal Academy. **Chris Grinter** (cgrinter@calacademy.org), Alice Fornariae and Jacob Montz, California Academy of Sciences, San Francisco, CA

4:15 Discussion: Making connections and changing bycatch from irritant to inspiration

Member Symposium: Growing the Next Generation of Entomology Advocates: A Focus on Entomology Education with Middle and High School Students

Room 261 (America's Center)

Moderators and Organizers: Douglas Golick¹, W. Wyatt Hoback² and David Held³, ¹Univ. of Nebraska, Lincoln, NE, ²Oklahoma State Univ., Stillwater, OK, ³Auburn Univ., Auburn, AL

1:30 Welcoming remarks

1:45 **1682** Using bugs to teach a revised scientific method and calm a primal fear. **John Guyton** (j.guyton@msstate.edu), Mississippi State Univ., Mississippi State, MS

2:00 **1683** BugBots: Blending entomology and engineering to teach about insect form, function, and locomotion. **Douglas Golick** (dgolick2@unl.edu), Jennifer Keshwani, Courtney Wallner and Jordan Kuck, Univ. of Nebraska, Lincoln, NE

2:15 **1684** Breaking bads: What student feedback indicates about multiple choice exams. **W. Wyatt Hoback** (whoback@okstate.edu), Oklahoma State Univ., Stillwater, OK

2:30 **1685** Taking the bore out of bio, the ugh out of ag, and the scare out of science: Changing the perceptions of science and agriculture via hands-on learning and storytelling. **Sarah Nash** (sarah.nash.ext@bayer.com), Bayer Crop Science, St. Louis, MO

2:45 Break

3:00 **1686** Creating real world entomology challenges for students through partnership. **Ronda Hamm** (ronda.hamm@corteva.com), Corteva Agriscience, Indianapolis, IN

3:15 **1687** Examining U.S. secondary science teachers' entomological content incorporation choices: A mixed-methods approach. **Erin Ingram** (erin.michelle.ingram@gmail.com), Douglas Golick, Jenny Dauer, Marion Ellis and Tiffany Heng-Moss, Univ. of Nebraska, Lincoln, NE

3:30 **1688** Breaking barriers: Connecting with people. **Robert Sober** (bsober@mac.com), art's IMPORTANT, LLC, Tulsa, OK

3:45 **1689** Tricks with ticks: Engaging the public in citizen science with less than lovable disease vectors. **Louise Lynch-O'brien** (llynchobrien@unl.edu) and Jody Green, Univ. of Nebraska, Lincoln, NE

4:00 STEM Bugs share fair and poster session

SD1690 Open access journals: A scalable method for teaching scientific writing. **Adrienne Brundage** (adrienne.brundage@tamu.edu), Texas A&M Univ., College Station, TX

SD1691 Monarch butterfly service learning: Education, outreach, and community connections. **Craig Coates** (ccoates@tamu.edu), Texas A&M Univ., College Station, TX

SD1692 Presentation withdrawn

SD1693 Engaging communities in insect conservation. **Matthew Shepherd** (matthew.shepherd@xerces.org) and Rachel Dunham, Xerces Society for Invertebrate Conservation, Portland, OR

Member Symposium: He pua no ka wekiu: Honoring the Life and Work of Roger Vargas

Room 122 (America's Center)

Moderators and Organizers: Jaime Pinero¹, Nicholas Manoukis², Jian Duan³, Thomas Green⁴ and John Stark⁵, ¹Univ. of Massachusetts, Amherst, MA, ²USDA - ARS, Hilo, HI, ³USDA - ARS, Newark, DE, ⁴IPM Institute of North America, Madison, WI, ⁵Washington State Univ., Puyallup, WA

1:30 Welcoming remarks

1:35 **1694** Family man, athlete, traveler. **Kathy Vargas** (krvargas@hawaiiantel.net), Kela Vargas and Noelani Vargas, Kamuela, HI

1:50 **1695** Roger and me: A thirty-year adventure. **John Stark** (starkj@wsu.edu), Washington State Univ., Puyallup, WA

2:05 **1696** Life table models for tephritid fruit fly invasions of California. **James R. Carey** (jrcarey@ucdavis.edu)¹ and Zihua Zhao², ¹Univ. of California, Davis, CA, ²China Agricultural Univ., Beijing, China

2:35 **1697** Modelling the effectiveness of parasitoid biological control on *B. dorsalis* in Senegal, West Africa. **John Banks** (jebanks@csumb.edu)¹, H. T. Banks², Natalie Cody², Annabel Meade², Elhadji Dieng³, Nicholas Manoukis⁴, Stephanie Gayle⁴ and Roger Vargas⁴, ¹California State Univ., Seaside, CA, ²North Carolina State Univ., Raleigh, NC, ³Crop Protection Directorate, Dakar, Senegal, ⁴USDA - ARS, Hilo, HI

2:50 **1698** Success stories in fruit fly (Diptera: Tephritidae) biological control: The legacy and significant contributions of Roger I. Vargas (1947–2018) and Ernest J. Harris (1928–2018). **Luc Leblanc** (leblanc@uidaho.edu)¹, Neil Miller² and Rudolph Putoa³, ¹Univ. of Idaho, Moscow, ID, ²USDA - ARS, Tallahassee, FL, ³Le Service du Development Rural, Papeete, Tahiti, French Polynesia

3:05 Break

3:20 **1699** Presentation withdrawn

3:35 **1700** The Hawai'i area-wide fruit fly pest management program: A winning prescription for agriculture in Hawai'i. **Ronald Mau** (maur@ctahr.hawaii.edu)¹, Eric B. Jang² and Roger Vargas², ¹Univ. of Hawai'i, Honolulu, HI, ²USDA - ARS, Hilo, HI

Oral Presentations

4:50 **1701** How research on fruit fly behavior led to improved attract-and-kill systems for tephritid fruit flies. **Jaime Pinero** (jpinero@umass.edu)¹, Steven Souder² and Roger Vargas², ¹Univ. of Massachusetts, Amherst, MA, ²USDA - ARS, Hilo, HI

4:05 **1702** Improving detection, monitoring, and male annihilation systems with solid multi-lure dispensers. Roger Vargas, Russell Iijima and **Steven Souder** (steven.souder@ars.usda.gov), USDA - ARS, Hilo, HI

4:20 **1703** Horizontal transfer of insecticides in tephritid fruit flies leads to greater mortality. **Ming Yi Chou** (mingyichou@dragon.nchu.edu.tw)¹, Helen Spafford², Steve Souder³ and Roger Vargas³, ¹National Chung Hsing Univ., Taichung, Taiwan, ²Univ. of Hawai'i, Honolulu, HI, ³USDA - ARS, Hilo, HI

4:35 Concluding remarks

Member Symposium: New Frontiers in the Study of Insect Vectors of Plant Pathogens

Room 127 (America's Center)

Moderator and Organizer: Ismael E. Badillo-Vargas, Texas A&M Univ., College Station, TX

1:30 **1704** Polerovirus-aphid interactions: A view from the interface of evolutionary and molecular biology. **Michelle (Cilia) Heck** (mhc68@cornell.edu), Cornell Univ., Ithaca, NY

2:00 **1705** Exploiting genome variation to dissect mechanisms mediating plant-virus-vector interactions. Ana Bravo-Cazar, Nyd Sertsuvalkul, Clare Casteel and **Sayanta Bera** (sbera@ucdavis.edu), Univ. of California, Davis, CA

2:15 **1706** Unseen changes over time: Quantifying the dynamics of viruses and insect vectors affecting drought tolerant perennial squash. **Tessa Shates** (tshat003@ucr.edu), Penglin Sun, Oaksoe Aung and Kerry Mauck, Univ. of California, Riverside, CA

2:30 **1707** What's new on soybean vein necrosis virus? **Jinlong Han** (jhan8@ncsu.edu)¹, Priyanka Mittapelly² and Punya Nachappa², ¹North Carolina State Univ., Raleigh, NC, ²Colorado State Univ., Fort Collins, CO

2:45 **1708** Functional analysis of western flower thrips salivary gland genes. **Sulley Ben-Mahmoud** (sbenmahmoud@ucdavis.edu) and Diane E. Ullman, Univ. of California, Davis, CA

3:00 **1709** Exploring the Delticocephaline leafhopper transcriptomes, a comparative analysis for the elucidation of vector competence genes. **Christian Ayala-Ortiz** (christian.ayala_ortiz10@cornell.edu), Tanya Blasius and Alia Waghorn, Ohio Univ., OH, USA

3:30 **1710** Molecular breadcrumbs: Use of gut content analysis to track landscape movements of insect vectors. **William Rodney Cooper** (rodney.cooper@ars.usda.gov)¹, David R. Horton and Ismael E. Badillo-Vargas², ¹USDA - ARS, Wapato, WA, ²Texas A&M Univ., College Station, TX

3:45 **1711** The lasting effects of tomato psyllid, *Bactericera cockerelli* Šulc (Hemiptera: Triozidae) infestation and infection '*Candidatus Liberibacter solanacearum*' on tomato plant gene expression. **Kyle Harrison** (kharrison@tamu.edu)¹, Azucena Mendoza¹, Cecilia Tamborindeguy¹, Silvia Rondon² and Julien Levy¹, ¹Texas A&M Univ., College Station, TX, ²Oregon State Univ., Hermiston, OR

4:00 **1712** Molecular interactions between '*Candidatus Liberibacter solanacearum*' and potato psyllid, *Bactericera cockerelli* at the gut interface. **Xiaotian Tang** (tangxt@tamu.edu) and Cecilia Tamborindeguy, Texas A&M Univ., College Station, TX

4:15 **1713** Electronic monitoring of *Bactericera cockerelli* feeding behavior on susceptible and resistant tomato lines. **Kyle Koch** (kyle.koch@ag.tamu.edu)¹, Estefanie Bernal Jimenez² and Ismael E. Badillo-Vargas¹, ¹Texas A&M Univ., College Station, TX, ²Texas A&M AgriLife Research, Weslaco, TX

4:30 **1714** Manipulating microbes for management of the Asian citrus psyllid (Hemiptera: Liviidae) and the Huanglongbing pathosystem. **Kirsten Pelz-Stelinski** (pelzstelinski@ufl.edu), Univ. of Florida, Lake Alfred, FL

4:45 **1715** The use of RNA interference techniques to understand the biology of Asian citrus psyllid, the vector of Huanglongbing in citrus. **Nabil Killiny** (nabilkilliny@ufl.edu), Univ. of Florida, Lake Alfred, FL

5:00 **1716** Development of RNA interference for the corn leafhopper, *Dalbulus maidis*. **Tara-Kay Jones** (jonestarakay1@tamu.edu), Raul F. Medina and Ismael E. Badillo-Vargas, Texas A&M Univ., College Station, TX

5:15 Panel Discussion

Member Symposium: Novel Modes of Delivering Chemicals and Control Agents to Manage Urban Pests and Vectors More Effectively

Room 280 (America's Center)

Moderators and Organizers: Raj Saran and Byron Reid, Bayer Crop Science, Research Triangle Park, NC

1:30 Introductory remark

1:35 **1717** Overcoming insecticide resistance for better management of the German cockroach. Michael Scharf and **Mahsa Fardisi** (mfardisi@purdue.edu), Purdue Univ., West Lafayette, IN

1:50 **1718** Behavioral effects of novel insect attractants/repellents and their applications in efficient ant and roach management. **Robert Vander Meer** (bob.vandermeer@ars.usda.gov), USDA - ARS, Gainesville, FL

2:20 **1719** Barricor SP - innovative formulation technology improves bioavailability of a pesticide on complex surfaces.
Alexander Ko (ko.e.alexander@gmail.com), Bayer Crop Science, Cary, NC

2:35 **1720** Vaccines targeting disease reservoirs to control zoonotic diseases in wildlife. **Jolieke van Oosterwijk** (jolieke.vanoosterwijk@usbiologic.com), US BIOLOGIC, Memphis, TN

2:50 **1721** Mosquitoes as vehicles to deliver pyriproxyfen.
Stephen Dobson¹ and **James Mains** (mains@mosquitomate.com)²,
¹UUniv. of Kentucky, Lexington, KY, ²MosquitoMate, Lexington, KY

3:05 **1722** Debug Fresno: A large-scale study using *Wolbachia* to suppress *Aedes aegypti* mosquito populations. **Jodi Holeman** (jholeman@mosquitobuzz.net) and Steve Mulligan, Consolidated Mosquito Abatement District, Parlier, CA

3:35 **1723** Exploring molecular physiology and symbiosis in the termite gut for development of next-generation management tools. **Michael Scharf** (mscharf@purdue.edu), Purdue Univ., West Lafayette, IN

Oral Presentations

3:50 **1724** Distribution of biodegradable nano- and microparticles in *Aedes aegypti* tissues. **Edmund Norris** (ejnorris@iastate.edu), Joel R. Coats, Caleb Corona, Adam Mullis and Balaji Narasimhan, Iowa State Univ., Ames, IA

4:20 **1725** The use of hydrogels for baiting pestiferous insects. **Dong-Hwan Choe** (dchoe003@ucr.edu), Univ. of California, Riverside, CA

4:35 Concluding remarks

Organized Meeting: IOBC NRS Annual Meeting: Early Career Professionals Advocating Biological Control

Room 131 (America's Center)

Moderators and Organizers: Ivan Hiltbold¹, Cesar Rodriguez² and Donald C. Weber³, ¹Univ. of Delaware, Newark, DE, ²Rutgers, The State Univ. of New Jersey, Chatsworth, NJ, ³USDA - ARS, Beltsville, MD

1:30 **1726** From the individual to across the landscape: Disease dynamics of the fall armyworm, *Spodoptera frugiperda*, and its specialist baculovirus. **Michael Garvey** (mgarvey@purdue.edu) and Bret Elderd, Louisiana State Univ., Baton Rouge, LA

1:50 **1727** Habitat management to improve biological control: Shaping predator traits and community interactions. **Carson Bower** (carson.bowers@uga.edu), Jason Schmidt and Michael Toews, Univ. of Georgia, Tifton, GA

2:10 **1728** Fertility management to promote herbivore resistance and conservation biological control. **Carmen Blubaugh** (carmen.blubaugh@gmail.com)¹ and William Snyder², ¹Clemson Univ., Clemson, SC, ²Washington State Univ., Pullman, WA

2:30 **1729** Biological control of arthropod pests on protected culture strawberry in New York. **Samantha Willden** (saw326@cornell.edu) and Gregory Loeb, Cornell Univ., Geneva, NY

2:50 **1730** Phytochemical and immunological mediation of interactions between a pathogenic densovirus and its lepidopteran hosts. **Nadya Muchoney** (nmuchoney@nevada.unr.edu)¹, M. Deane Bowers², Peri Mason³, Adrian L. Carper² and Angela Smilanich¹, ¹Univ. of Nevada, Reno, NV, ²Univ. of Colorado, Boulder, CO, ³Bard High School Early College, New York, NY

3:10 Break

3:20 **1731** Alternative controls for azalea lace bug in the Pacific Northwest. **Katerina Graham** (grahkate@oregonstate.edu)¹ and Jana Lee², ¹Oregon State Univ., Corvallis, OR, ²USDA - ARS, Corvallis, OR

3:40 **1732** IOBC-NRS MS Award Presentation: Conservation biological control of *Bemisia tabaci* in cotton using selective insecticides. **Isadora Bordini** (icb@email.arizona.edu)¹, Peter Ellsworth¹, Steven Naranjo² and Alfred Fournier¹, ¹Univ. of Arizona, Maricopa, AZ, ²USDA - ARS, Maricopa, AZ

4:00 **1733** IOBC-NRS PhD Award Presentation: Farm like an architect: Creating suitable conditions for beneficial invertebrates by interseeding cover crops. **Michael Bredeson** (michael.bredeson@sdstate.edu)^{1,2} and Jonathan Lundgren³, ¹Ecdysis Foundation, Brookings, SD, ²South Dakota State Univ., Brookings, SD, ³Ecdysis Foundation, Estelline, SD

4:20 **1734** IOBC-NRS Early-Career Award Presentation: Nonreproductive effects of insect parasitoids on their hosts: Importance for biological control. **Paul Abram** (paul.abram@canada.ca), Agriculture and Agri-Food Canada, Agassiz, BC, Canada

Organized Meeting: Sacred Order of the Geniculate Antennae (SOGA) Weevil Workers

Room 121 (America's Center)

Moderators and Organizers: Maria Lourdes Chamorro¹ and Robert S. Anderson², ¹USDA - ARS, Washington, DC, ²Canadian Museum of Nature, Ottawa, ON, Canada

1:30 Welcoming remarks

1:35 **1735** Weird wonderful weevils. **Robert S. Anderson** (randerson@mus-nature.ca), Canadian Museum of Nature, Ottawa, ON, Canada

1:50 **1736** New insights into the phylogeny and evolution of weevils and other Phytophaga (leaf beetles and longhorned beetles) from analyses of large-scale phylogenomic data.

Duane McKenna (dmckenna@memphis.edu), Dave Clarke and Seungwan Shin, Univ. of Memphis, Memphis, TN

2:05 **1737** Weevil phylogenomics in a Hi-C genome world, these aren't your grandpas UCEs. **Matthew Van Dam** (mvandam@calacademy.org)¹, Alex R. Van Dam², James Henderson¹, Analyn Cabras³, Athena Lam¹ and Michelle Trautwein¹, ¹California Academy of Sciences, San Francisco, CA, ²Univ. of Puerto Rico, Mayagüez, PR, ³Univ. of Mindanao, Mindanao, Philippines

2:20 **1738** Phylogeny and evolution of Burmese amber weevils (Coleoptera: Curculionoidea). **Dave Clarke** (djclarke@memphis.edu)¹, Rolf Oberprieler², Adriana Marvaldi³ and Duane McKenna¹, ¹Univ. of Memphis, Memphis, TN, ²CSIRO, Canberra, ACT, Australia, ³Univ. Nacional de La Plata, Buenos Aires, Argentina

2:35 **1739** A reclassification of the Lechiropini Lacordaire, 1865 (Curculionidae: Conoderinae). **Salvatore Anzaldo** (sanzaldo@asu.edu), Arizona State Univ., Tempe, AZ

2:50 **1740** Using species delimitation to understand specialization in palm flower weevils. **Bruno de Medeiros** (souzademedeiros@fas.harvard.edu), Harvard Univ., Cambridge, MA

3:05 Break and poster session

SD1741 Curation of the National Anthribidae (Coleoptera: Curculionoidea) Collection and integration of the large Barry D. Valentine fungus weevil acquisition. **Maria Lourdes Chamorro** (lourdes.chamorro@ars.usda.gov)¹, Sarah Zuehlke² and Floyd Shockley², ¹USDA - ARS, Washington, DC, ²Smithsonian Institution, National Museum of Natural History, Washington, DC

SD1742 Morphological characters useful for identifying the three geographical forms of *Anthonomus grandis* Boheman. Ryan Whitehouse¹ and **Richard Brown** (moth@ra.msstate.edu)², ¹Mississippi State Univ., Mississippi State, MS, ²Mississippi Entomological Museum, Mississippi State, MS

SD1743 Key to the *Rhyssomatus* (Curculionidae: Molytinae) of Arizona. **Katherine Arguez** (karguez@asu.edu), Arizona State Univ., Tempe, AZ

SD1744 Presentation withdrawn

3:15 **1745** Down the rabbit hole: Nosing through the Texas A&M unidentified *Listronotus* Jekel, 1865 (Curculionidae: Cyclominae) horde. **Guy Hanley** (ghanley701@gmail.com), Northern Plains Entomology, Minot, ND

3:30 **1746** Relations across kingdoms: Ecuadorian *Coptoborus* and *Theoborus* (Curculionidae: Scolytinae : Xyleborini) and their fungal partners. **Rachel Osborn** (rachelkosborn@gmail.com)¹ and Anthony Cognato², ¹Michigan State Univ., Okemos, MI, ²Michigan State Univ., East Lansing, MI

Oral Presentations

3:10 **1766** Prevalence of cutaneous leishmaniasis in district Malakand Khyber Pakhtunkhwa, Pakistan and its *in vitro* plant-based control. **Naveeda Qureshi** (naveedaqresh@gmail.com), Quaid-i-Azam Univ., Islamabad, Pakistan

3:20 **1767** Identification of a prostaglandin E2 signaling pathway in *Anopheles gambiae* that mediates phenoloxidase activity and limits *Plasmodium* oocyst survival. **Hyegsun Kwon** (hskwon@iastate.edu) and Ryan Smith, Iowa State Univ., Ames, IA

3:30 **1768** Chemical depletion of phagocytic immune cells in *Anopheles gambiae* provides new insights into hemocyte immune function and malaria parasite killing. Hyegsun Kwon and **Ryan Smith** (smithr@iastate.edu), Iowa State Univ., Ames, IA

3:40 **1769** Studies on the sporozoite microneme proteins of *P. vivax*. **Neera Kapoor** (neerakapoor@ignou.ac.in), Indira Gandhi National Open Univ., New Delhi, India

3:50 **1770** Larval nutrient availability has long-term effects on the midgut microbiome of *Aedes aegypti* mosquitoes. **Sarah Short** (short.343@osu.edu)¹, Hannah MacLeod² and George Dimopoulos², ¹The Ohio State Univ., Columbus, OH, ²Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

4:00 Break

4:10 **1771** Efficacy of mosquito repellent products with various delivery systems in repelling *Aedes aegypti* L. (Diptera: Culicidae) a vector of Zika virus. **Stacy D. Rodriguez** (stacyr@nmsu.edu), Soumi Mitra, Yashoda Kandel, Joel Cordova, Hailey Rodriguez and Immo Hansen, New Mexico State Univ., Las Cruces, NM

4:20 **1772** Presentation withdrawn

4:30 **1773** The role of *Aedes aegypti* PGRPs in the early recognition of fungal infection. **Jose Luis Ramirez** (jose.ramirez@ars.usda.gov), Ephantus Muturi, Lina Flor-Weiler and Alejandro Rooney, USDA - ARS, Peoria, IL

4:40 **1774** Identifying systemic barriers to Zika virus replication in resistant *Culex quinquefasciatus*. **Hannah MacLeod** (hmacleod@jhu.edu) and George Dimopoulos, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

4:50 **1775** What I love about you? You really make me itch! The weird mosquitoes of the world. **Ary Faraji** (ary@slcmad.org)¹, Stephen Doggett² and Christina Liew³, ¹Salt Lake City Mosquito Abatement District, Salt Lake City, UT, ²ICPMR Westmead, Westmead, NSW, Australia, ³Singapore National Environment Agency, Singapore, Singapore

5:00 **1776** Influence of breeding sites bacterial communities on *Aedes aegypti* microbiome and vector competence for dengue and Zika viruses. **Lyza Hery** (lhery@pasteur-guadeloupe.fr)¹, Antoine Boulis¹, Christelle Dollin¹, Sébastien Breurec² and Anubis Vega-Rua², ¹Institute Pasteur, Guadeloupe, France, ²Guadeloupe Univ. Hospital, Guadeloupe, France

10-min: PBT, Genetics and Genomics

Room 274 (America's Center)

Moderators: Anastasia Cooper¹ and William Reid², ¹Kansas State Univ., Manhattan, KS, ²Univ. of Missouri, Columbia, MO

1:30 **1777** Re-targeting genomic loci of stable transgene expression in *Aedes aegypti* for transgenic cargo integration. **William Reid** (reidwi@missouri.edu)¹, Jinyin Lin¹, Yingjun Cui¹, Shengzhang Dong² and Alexander Franz¹, ¹Univ. of Missouri, Columbia, MO, ²Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

1:40 **1778** Molecular and functional characterization of masculinizer gene in *Helicoverpa armigera*. **Zhongyuan Deng** (490096812@qq.com)¹, Yakun Zhang² and Xianchun Li³, ¹Zhengzhou Univ., Zhengzhou, China, ²Chinese Academy of Agricultural Sciences, Beijing, China, ³Univ. of Arizona, Tucson, AZ

1:50 **1779** Gene expression analysis in the embryo of the corn leafhopper *Dalbulus maidis* (Hemiptera: Cicadellidae). Lucía Dalaisón¹, Víctor Palacio¹, Lucila Pérez-Gianmarco¹, Elías Gazzá¹, Agustina Pascual¹, Hugo González¹, Natalia Esponda-Behrens², María Inés Catalano¹ and **Rolando Rivera-Pomar** (rrivera@unnoba.edu.ar)¹, ¹Univ. Nacional del Noroeste de Buenos Aires, Pergamino, Argentina, ²Univ. Nacional de La Plata, La Plata, Argentina

2:00 **1780** RNAi-induced silencing of eye color genes in the southern green stink bug *Nezara viridula* (L.). **Dariane Souza** (dariane.souza@ufi.edu)¹, Ke Wu¹, Paul Shirk² and Blair Siegfried¹, ¹Univ. of Florida, Gainesville, FL, ²USDA - ARS, Gainesville, FL

2:10 **1781** Genetic variation and molecular regulation of cold hardness in spotted-wing drosophila. **Mark Garcia** (mjga237@uky.edu) and Nicholas Teets, Univ. of Kentucky, Lexington, KY

2:20 **1782** Transcriptional mechanisms of diapause in the corn rootworm complex. **Melise Lecheta** (melise.lecheta@uky.edu) and Nicholas Teets, Univ. of Kentucky, Lexington, KY

2:30 Break

2:40 **1783** Transcriptomic differences between stable and declining bumble bee (*Bombus*) species exposed to neonicotinoid pesticides and *Nosema bombi* pathogens. **Rubén Martín-Blázquez** (rumabl@illinois.edu)¹, Austin Calhoun², James Strange³, Ben Sadd² and Sydney A. Cameron¹, ¹Univ. of Illinois, Champaign, IL, ²Illinois State Univ., Normal, IL, ³USDA - ARS, Logan, UT

2:50 **1784** Deformed wing virus induces a posttranslational modification to AKT that leads to a reduction in the biochemical compounds required for sustained flight in the European honey bee (*Apis mellifera*). **Matthew Heerman** (mch7766@ksu.edu), Steven Cook, Eugene Ryabov, Samuel Ramsey and Yanping Chen, USDA - ARS, Beltsville, MD

3:00 **1785** A novel mechanism of odorant receptor (OR) regulation in insects: Lessons from the malaria mosquito, *Anopheles gambiae*. **Sarah Maguire** (smaguir3@jhmi.edu)¹ and Christopher Potter², ¹Johns Hopkins Univ., Baltimore, MD, ²Johns Hopkins Univ. School of Medicine, Baltimore, MD

3:10 **1786** Genetic architecture of thermal tolerance in *Drosophila melanogaster*. **Nicholas Teets** (n.teets@uky.edu), Melise Lecheta and David Awde, Univ. of Kentucky, Lexington, KY

3:20 **1787** High mobility group box 1 as a damage-associated molecular pattern in *Spodoptera exigua*. **Yonggyun Kim** (hosanna@anu.ac.kr), Andong National Univ., Andong, South Korea

3:30 Break

3:40 **1788** Presentation withdrawn

Oral Presentations

3:50 **1789** Genome of the African cassava whitefly, *Bemisia tabaci*, and their distribution and genetic diversity across eighteen cassava-growing countries in Africa. Wenbo Chen¹, Everlyne Wosula², **Daniel Hasegawa** (daniel.hasegawa@ars.usda.gov)³, Clerisse Casinga⁴, Rudolph Shirima², Komi Fiaboe⁵, Rachid Hanna⁵, Apollin Fost⁶, Georg Goergen⁶, Manuele Tamo⁶, George Mahuku², Harun Murithi², Leena Tripathi⁷, Bernard Mware⁷, Lava Kumar⁸, Pheneches Ntarwuruhunga⁹, Chris Moyo¹⁰, Marie Yomeni¹¹, Steve Boahen¹², Michael Edet¹³, Wasiu Awoyale¹³, William Wintermantel³, Kai-Shu Ling¹⁴, James Legg² and Zhanjun Fei¹⁵, ¹Boyce Thompson Institute, Ithaca, NY, ²International Institute of Tropical Agriculture, Dar es Salaam, Tanzania, ³USDA - ARS, Salinas, CA, ⁴International Institute of Tropical Agriculture, Kalambo, Democratic Republic of the Congo, ⁵International Institute of Tropical Agriculture, Yaoundé, Cameroon, ⁶International Institute of Tropical Agriculture, Cotonou, Benin, ⁷International Institute of Tropical Agriculture, Nairobi, Kenya, ⁸International Institute of Tropical Agriculture, Ibadan, Nigeria, ⁹International Institute of Tropical Agriculture, Lusaka, Zambia, ¹⁰International Institute of Tropical Agriculture, Lilongwe, Malawi, ¹¹International Institute of Tropical Agriculture, Freetown, Sierra Leone, ¹²International Institute of Tropical Agriculture, Nampula, Mozambique, ¹³International Institute of Tropical Agriculture, Suakoko, Liberia, ¹⁴USDA - ARS, Charleston, SC, ¹⁵Cornell Univ., Ithaca, NY

4:00 **1790** Phylogenetic analysis of arthropod transferrins. **Maureen Gorman** (mgorman@ksu.edu), Diana Najera, Jacob Weber and Neal Dittmer, Kansas State Univ., Manhattan, KS

4:10 **1791** Discovery of bioactive peptides through G-protein coupled receptor-based screening. **Man-Yeon Choi** (mychoi@ars.usda.gov)¹, Seung-Joon Ahn² and Robert Vander Meer³, ¹USDA - ARS, Corvallis, OR, ²Oregon State Univ., Corvallis, OR, ³USDA - ARS, Gainesville, FL

4:20 **1792** Expressional divergence of GOX and L-ACY-1 in specialist and generalist *Helicoverpa* species. **Xianchun Li** (lxc@email.arizona.edu)¹, Lihong Yang², Qian Cheng² and Xiongya Wang¹, ¹Univ. of Arizona, Tucson, AZ, ²Chinese Academy of Agricultural Sciences, Beijing, China

10-min: SysEB, Pests, Invasives, and Biological Control

Room 126 (America's Center)

Moderators: James Whitfield¹ and Marina Ascunce², ¹Univ. of Illinois, Champaign, IL, ²Univ. of Florida, Gainesville, FL

1:30 **1793** Relationship between population dynamics of Oriental fruit flies and biotic factors in different years, 2012 and 2017 in Yezin, Myanmar. **Nwe Yin** (nnynin86@gmail.com), Dept. of Agricultural Research, Yezin, Myanmar

1:40 **1794** Evidence for an ichnovirus machinery in parasitoids of coleopteran larvae. Stéphanie Robin¹, Marc Revallenc², Marie Fraysinet², **James Whitfield** (jwhitfie@life.illinois.edu)³, Véronique Jouan², Fabrice Legeai¹ and Anne-Nathalie Volkoff², ¹INRA, Le Rheu, France, ²INRA, Montpellier, France, ³Univ. of Illinois, Champaign, IL

1:50 **1795** Evidence for evolutionary change in invasive populations of *Drosophila suzukii* in Hawai'i. **Jonathan Koch** (kochj@hawaii.edu), Univ. of Hawai'i, Hilo, HI

2:00 **1796** Does getting defensive get you anywhere?—Testing a role for seasonal balancing selection in the dynamic polymorphism of a protective endosymbiont. Andrew H. Smith¹, Michael O'Connor², Kerry M. Oliver³ and **Jacob Russell** (jar337@drexel.edu)², ¹Rodale Institute, Kutztown, PA, ²Drexel Univ., Philadelphia, PA, ³Univ. of Georgia, Athens, GA

2:10 **1797** Report from an arthropod and plant survey of a high-elevation Aeolian ecosystem on Hawai'i Island. **Matthew J. Medeiros** (matt.j.medeiros@gmail.com), Univ. of Nevada, Las Vegas, NV

2:20 **1798** Geography of an environmentally-acquired symbiosis: Is the bug-*Burkholderia* mutualism spatially structured? **Alison Ravenscraft** (aravenscraft@gmail.com)^{1,2} and Martha Hunter², ¹Univ. of Texas, Arlington, TX, ²Univ. of Arizona, Tucson, AZ

2:30 **1799** Presentation withdrawn

2:40 **1800** Invasive tropical fire ants, *Solenopsis geminata*, in the Galapagos Islands. **Marina Ascunce** (ascunce@ufl.edu)¹, Henri Herrera², Yesenia Campaña², Robert Vander Meer³ and Sanford Porter³, ¹Univ. of Florida, Gainesville, FL, ²Escuela Superior Politécnica de Chimborazo, Riobamba, Ecuador, ³USDA - ARS, Gainesville, FL

2:50 **1801** The use of molecular forensics to identify host-parasitoid associations in biological control programs. **Tara Gariepy** (tara.gariepy@canada.ca), Agriculture and Agri-Food Canada, London, ON, Canada

3:00 **1802** Deciphering host-parasitoid interactions and parasitism rates of crop pests using DNA metabarcoding. **Ahmadou Sow** (s_ahmadou@yahoo.fr)¹, Thierry Brévault^{2,3}, Laure Benoit^{3,4}, Marie-Pierre Chapuis⁵, Maxime Galan^{3,4}, Armelle Coeur d'Acier^{3,4}, Gérard Delvare³, Mbacke Sembene⁶ and Julien Haran^{3,4}, ¹Univ. Cheikh Anta Diop, Dakar, Senegal, ²BIOPASS, Dakar, Senegal, ³INRA - CIRAD, Montpellier, France, ⁴Univ. of Montpellier, Montpellier France, ⁵INRA - CIRAD, Montferrier-sur-Lez, France, ⁶Cheikh Anta Diop Univ., Dakar, Senegal

3:10 **1803** Cryptic diversity in the mosquito species *Coquillettidia perturbans* (Diptera: Culicidae). Lawrence Reeves¹, **Charlie Sither** (cbsither@gmail.com)², Nathan D. Burkett-Cadena³, Brian D. Byrd⁴, John Soghigian⁵, Michael Reiskind² and Brian M. Wiegmann², ¹Univ. of Florida, Vero Beach, FL, ²North Carolina State Univ., Raleigh, NC, ³Auburn Univ., Auburn, AL, ⁴Western Carolina Univ., Cullowhee, NC, ⁵Clark Univ., Worcester, MA

3:20 **1804** Post-release assessment of Wolbachia endosymbiont and genetic diversity of the recovered *Psytalia lounsburyi*, a biocontrol agent of the olive fruit fly in California. **Mélanie Tannières** (mtannieres@ars-eblc.org)¹, Marie-Claude Bon¹, Kent Daane², Charles H. Pickett³, Xingeng Wang², Ludovic Manaargadoo¹, Arnaud Blanchet¹, Fatiha Guermache¹ and Kim Hoelmer⁴, ¹USDA - ARS, Montferrier-sur-Lez, France, ²Univ. of California, Parlier, CA, ³California Dept. of Food and Agriculture, Sacramento, CA, ⁴USDA - ARS, Newark, DE

10-min: SysEB, Systematics, Ecology, and Morphology of Lepidoptera

Room 130 (America's Center)

Moderators: Todd Gilligan¹ and M. Alma Solis², ¹USDA - APHIS, Fort Collins, CO, ²USDA - ARS, Washington, DC

2:00 **1805** Eastern monarch butterfly (*Danaus plexippus*; Lepidoptera: Nymphalidae: Danainae) fall migratory roadkill distribution and hotspot regions within the coastal and central migratory funnels of Texas. **James Tracy** (jamesltracey@tamu.edu) and Robert Coulson, Texas A&M Univ., College Station, TX

2:10 **1806** Unraveling the knot: Examining the Mitchell's satyr (*Neonympha mitchelli* spp.) subspecies. **Matthew Thorn** (mjt152@msstate.edu), Jennifer Seltzer and JoVonn Hill, Mississippi State Univ., Mississippi State, MS

Oral Presentations

2:20 **1807** Preparing for the seemingly inevitable: A summary of *Helicoverpa armigera* diagnostics research and our current preparedness. **Todd Gilligan** (todd.m.gilligan@usda.gov)¹, Luke Tembrock², Alicia Timm², Frida Zink², Norman Barr³, Roxanne Farris³, Gregory Sword⁴, Omaththage Perera⁵ and Jose Verle Rodrigues⁶, ¹USDA - APHIS, Fort Collins, CO, ²Colorado State Univ., Fort Collins, CO, ³USDA - APHIS, Edinburg, TX, ⁴Texas A&M Univ., College Station, TX, ⁵USDA - ARS, Stoneville, MS, ⁶Univ. of Puerto Rico, San Juan, PR

2:30 **1808** Broad-scale temporal and spatial patterns of gypsy moth invasion. **Gabriela Nunez-Mir** (gcnunezmir@vcu.edu) and Derek Johnson, Virginia Commonwealth Univ., Richmond, VA

2:40 **1809** The wing venation of Lepidoptera violates Murray's Law, suggesting weak selective pressures for fluid transport. **Sandra Schachat** (schachat@stanford.edu), Stanford Univ., Stanford, CA

2:50 **1810** Association of larval *Phuphena* (Lepidoptera: Noctuidae) with leptosporangiate ferns (Polypodiidae), the limits of Eriopinae, and a lepidopteran-hymenopteran mimicry triangle. **Paul Z. Goldstein** (paul.goldstein@ars.usda.gov)¹, Alberto Zilli², Dan Janzen³ and Winnie Hallwachs³, ¹USDA - ARS, Washington, DC, ²The Natural History Museum, London, United Kingdom, ³Univ. of Pennsylvania, Philadelphia, PA

3:00 **1811** Describing two diurnal *Agrotis* species (Lepidoptera: Noctuidae) in the subalpine and alpine regions (3000–4205 m) of Hawai'i Island, Hawai'i. Matthew J. Medeiros^{1,2}, **Jessica Kirkpatrick** (jakirkpa@hawaii.edu)³, Christine Elliott⁴, Andersson Prestes⁴, Jesse Eiben⁵ and Daniel Rubinoff⁴, ¹Urban School of San Francisco, San Francisco, CA, ²Univ. of Nevada, Las Vegas, NV, ³Office of Maunakea Management, Hilo, HI, ⁴Univ. of Hawai'i, Honolulu, HI, ⁵Univ. of Hawai'i, Hilo, HI

3:10 **1812** Species delimitation in micromoths (Lepidoptera: Gelechioidae) based on DNA barcodes. **Sora Kim** (s.kim.microlepi@gmail.com)¹, Yerim Lee¹, Marko Mutanen², Jinbae Seung¹ and Seunghwan Lee¹, Seoul National Univ., Seoul, South Korea, ²Univ. of Oulu, Oulu, Finland

3:20 **1813** Deception, thievery, and mutualism in the orchid-insect world. **Jacqueline Miller** (jmiller@flmnh.ufl.edu)¹ and Deborah Matthews², ¹Univ. of Florida, Gainesville, FL, ²Florida Museum of Natural History, Gainesville, FL

3:30 **1814** *Asturodes*: New species, food plants, and abdominal androconial scales (Lepidoptera: Crambidae). **M. Alma Solis** (alma.solis@usda.gov)¹, Eugenie Phillips-Rodríguez², Winnie Hallwachs³, Tanya Dapkey³ and Daniel H. Janzen³, ¹USDA - ARS, Washington, DC, ²Museo Nacional de Costa Rica, San José, Costa Rica, ³Univ. of Pennsylvania, Philadelphia, PA

3:40 **1815** Presentation withdrawn

Member Symposium: Regulatory Entomology: Many Hands, One Mind

Room 263 (America's Center)

Moderators and Organizers: Jason Hansen¹ and Christine Lynch², ¹USDA - APHIS, Los Indios, TX, ²USDA - APHIS, Honolulu, HI

2:30 Welcoming remarks

2:35 **1816** Pest surveillance and the detection of exotic pests in the United States. **Christopher Pierce** (christopher.pierce@usda.gov), USDA - APHIS, Jefferson City, MO

2:50 **1817** Regulatory entomology in Tennessee: History and current status. **Joshua P. Basham** (joshua.basham@tn.gov), Tennessee State Univ., McMinnville, TN

3:05 **1818** Fighting back against invasive pests in the lone star state: A state plant health director perspective. Stuart Kuehn and **Ruben Guerra** (ruben.r.guerra@usda.gov), USDA - APHIS, Austin, TX

3:20 **1819** Shifting the paradigm for SIR (Sterile Insect Release) programs. **Lisa Neven** (lisa.neven@ars.usda.gov)¹ and Nathan Moses-Gonzales², ¹USDA - ARS, Wapato, WA, ²M3 Consulting Group, Dayton, OH

3:35 **1820** Building diagnostic tools in the field. **David McCoy** (david.w.mccoy@usda.gov), USDA - APHIS, Los Indios, TX

3:50 Break

4:00 **1821** Hawai'i USDA APHIS PPQ canine unit: Safeguarding US mainland from tropical insect pests. **Christine Lynch** (christine.a.lynch@usda.gov), USDA - APHIS, Honolulu, HI

4:15 **1822** Exotic pests intercepted in US ports of entry on imported cut flowers. **Joel Perez-Mendoza** (joel.perez-mendoza@usda.gov), USDA - APHIS, Riverdale, MD

4:30 **1823** Rearing for regulatory entomology at APHIS Otis laboratory. **Hannah Nadel** (hannah.nadel@usda.gov), USDA - APHIS, Buzzards Bay, MA

4:45 **1824** Identification Technology Program (ITP) – Fortifying your ID toolbox. **Hanna Royals** (hanna.h.royals@usda.gov), USDA - APHIS, Fort Collins, CO

5:00 **1825** Preclearance and offshore programs: Leaving pests behind. Jennifer Smythe and **Brendon J. Reardon** (brendon.reardon@usda.gov), USDA - APHIS, Riverdale, MD

5:15 **1826** Recruiting entomologists: Using your mind to hire new hands. **Stephen Young** (stephen.t.young@usda.gov), USDA - APHIS, Blaine, WA

Organized Meeting: International Branch Meeting

Room 132 (America's Center)

Moderators and Organizers: Zeyaur Khan¹, Thomas Simonsen² and Johnnie Van den Berg³, ¹International Centre of Insect Physiology and Ecology (icipe), Nairobi, Kenya, ²Natural History Museum, Aarhus, Denmark, ³North-West University, Potchefstroom, South Africa

3:30 Welcome and introductory remarks

3:45 **2351** International Branch John Henry Comstock Award winner presentation: Systematic study of longhorned beetles (Coleoptera: Cerambycidae). **Seunghyun Lee** (chiyark@snu.ac.kr), Seoul National Univ., Seoul, South Korea

4:00 **2352** International Branch Distinguished Scientist Award winner presentation: Pest and beneficial insects: combining in contributing to global sustainability in agriculture. Guy Smagghe¹ and **Olivier Christiaens** (olchrist.christiaens@ugent.be)², ¹Southwest Univ., Chongqing, China, ²Ghent Univ., Ghent, Belgium

4:15 Recognition of newly elected officers

4:20 News from the Governing Board and Treasurer's report

4:30 Update from the committee chairs

Oral Presentations

4:40 Announcement of the 2020 IB Virtual Symposium

4:45 International Branch social

10-min: SysEB, Systematics, Evolution, and Diversity of Hymenoptera

Room 126 (America's Center)

Moderators: Bonnie Blaimer¹ and John M. Heraty², ¹North Carolina State Univ., Raleigh, NC, ²Univ. of California, Riverside, CA

3:30 **1827** Phylogenomic insights into the evolution of parasitoidism in Hymenoptera. **Bonnie Blaimer** (bonnie.blaimer@ncsu.edu)¹, Matt Buffington², Astrid Cruaud³, Michael Gates², Robert R. Kula², István Mikó⁴, Jean-Yves Rasplus³, Bernardo Santos⁵, David Smith², Elijah Talamas⁶ and Seán Brady⁵, ¹North Carolina State Univ., Raleigh, NC, ²USDA - ARS, Washington, DC, ³INRA, Montferrier-sur-Lez, France, ⁴Univ. of New Hampshire, Durham, NH, ⁵Smithsonian Institution, National Museum of Natural History, Washington, DC, ⁶Florida Dept. of Agriculture and Consumer Services, Gainesville, FL

3:40 **1828** The first phylogenetic analyses of *Bembix*, a historically important genus of solitary wasps (Hymenoptera: Bembicidae). **Jeremy Frank** (jfrank@amnh.org), Independent Scholar, New York, NY

3:50 **1829** Exploring Eurytomidae with UCEs, toward a new classification. **Michael Gates** (michael.gates@ars.usda.gov)¹, Bonnie Blaimer², Gérard Delvare³, Jean-Yves Rasplus⁴, Astrid Cruaud⁴ and Seán Brady⁵, ¹USDA - ARS, Washington, DC, ²North Carolina State Univ., Raleigh, NC, ³INRA - CIRAD, Montpellier, France, ⁴INRA, Montferrier-sur-Lez, France, ⁵Smithsonian Institution, National Museum of Natural History, Washington, DC

4:00 **1830** Chrysidoidea: Superfamily or simply seven families? **Elizabeth Murray** (emurr001@ucr.edu)¹, Silas Bossert^{1,2}, Bryan N. Danforth², James Pitts³ and Seán Brady¹, ¹Smithsonian Institution, National Museum of Natural History, Washington, DC, ²Cornell Univ., Ithaca, NY, ³Utah State Univ., Logan, UT

4:10 **1831** Return on investment: Systematics and evolution of Platygastroidea in the 21st century. **Norman Johnson** (johnson.2@osu.edu)¹, Andrew Austin², Luciana Musetti¹, Zachary Lahey¹ and Huayan Chen¹, ¹The Ohio State Univ., Columbus, OH, ²Univ. of Adelaide, Adelaide, Australia

4:20 **1832** Evolution and diversification of Hymenoptera: Merging UCE, genomic, and transcriptomic data. **Jessica Gillung** (jgillung@ucdavis.edu)¹, Elizabeth Murray², Silas Bossert², Sean Brady², James Pitts³ and Bryan N. Danforth¹, ¹Cornell Univ., Ithaca, NY, ²Smithsonian Institution, National Museum of Natural History, Washington, DC, ³Utah State Univ., Logan, UT

4:30 **1833** Effects of nutritional physiology on reproductive caste in a eusocial tropical paper wasp (*Mischocyttarus pallidippectus*). **Katherine Fiocca** (kaf363@drexel.edu), Emily Fanwick, Kyle Moynahan, Kelsey Capobianco, Paula Zelanko, David Velinsky and Sean O'Donnell, Drexel Univ., Philadelphia, PA

4:40 **1834** Paper wasps on the road: Phylogenomics, biogeography, and diversification in *Polistes* social wasps (Hymenoptera: Vespidae). **Bernardo Santos** (santosbe@si.edu)¹, Elizabeth Murray¹, J. M. Carpenter² and Seán Brady¹, ¹Smithsonian Institution, National Museum of Natural History, Washington, DC, ²American Museum of Natural History, New York, NY

4:50 **1835** Down the rabbit hole: A phylogenetic hypothesis for the Chalcidoidea. **John M. Heraty** (john.heraty@ucr.edu)¹, Roger A. Burks¹, Junxia Zhang², James Woolley³, Matthew J. Yoder⁴, Ralph Peters⁵, Astrid Cruaud⁶, Jean-Yves Rasplus⁶ and Lars Krogmann⁷, ¹Univ. of California, Riverside, CA, ²Hebei Univ., Hebei, China, ³Texas A&M Univ., College Station, TX, ⁴Univ. of Illinois, Champaign, IL, ⁵Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany, ⁶INRA, Montferrier-sur-Lez, France, ⁷State Museum of Natural History, Stuttgart, Germany

5:00 **1836** Presentation withdrawn

5:10 **1837** Gastral drumming in *Vespa germanica* and its role in colony organization. **Benjamin Taylor** (btaylor@lagcc.cuny.edu), LaGuardia Community College, City Univ. of New York, Long Island City, NY

10-min: SysEB, Evolution and Diversity of Odonata and Polyneoptera

Room 130 (America's Center)

Moderators: Thomas Simonsen¹ and Torsten Dikow², ¹Natural History Museum, Aarhus, Denmark, ²Smithsonian Institution, National Museum of Natural History, Washington, DC

4:00 **1838** Northward extensions of Orthoptera into the Chicago region. **Carl Strang** (wildlifer@aol.com), Independent Researcher, Warrenville, IL

4:10 **1839** Mid-Cretaceous amber stick insects elucidate early evolution and morphological development. **Chungkun Shih** (chungkun.shih@gmail.com)¹, Taiping Gao², Sha Chen² and Dong Ren², ¹Smithsonian Institution, National Museum of Natural History, Washington, DC, ²Capital Normal Univ., Beijing, China

4:20 **1840** Ant colony traits and phenotypic plasticity in parasitic ant-crickets. **Christina Kwapičh** (ckwapičh@asu.edu) and Bert Hölldobler, Arizona State Univ., Tempe, AZ

4:30 **1841** *Leucorrhinia*, white face dragonflies, in North America and Northern Europe. **Jessica Ware** (jware42@newark.rutgers.edu)¹ and Göran Sählen², ¹Rutgers, The State Univ. of New Jersey, Newark, NJ, ²Halmstad Univ., Halmstad, Sweden

4:40 **1842** Barcoding at a biogeographical crossroad: COI diversity of Danish Odonata in a European context. **Thomas Simonsen** (t.simonsen@nathist.dk), Marie Djernæs and Kent Olsen, Natural History Museum, Aarhus, Denmark

4:50 **1843** Mobilizing data from taxonomic literature for a lineage of damselflies (Odonata: Lestoidea). Jeremy Miller^{1,2}, Hector Ortega Salas², **Torsten Dikow** (dikowt@si.edu)³, Klaas-Douwe Dijkstra², Jan van Tol², Guido Sautter¹ and Donat Agosti¹, ¹Plazi.org, Bern, Switzerland, ²Naturalis Biodiversity Center, Leiden, Netherlands, ³Smithsonian Institution, National Museum of Natural History, Washington, DC

5:00 **1844** Plecoptera of Indiana: Using museum data to determine spatial distributions and conservation need. **Evan A. Newman** (evanan2@illinois.edu)¹, R. Edward DeWalt² and Scott A. Grubbs³, ¹Univ. of Illinois, Champaign, IL, ²Illinois Natural History Survey, Champaign, IL, ³Western Kentucky Univ., Bowling Green, KY

Oral Presentations

TUESDAY, NOVEMBER 19, 2019 • EVENING

Organized Meeting: IUSSI North American Section Business Meeting

Room 124 (America's Center)

Moderators and Organizers: Jennifer Jandt¹, James C. Nieh² and Sara Cahan³, ¹Univ. of Otago, Dunedin, New Zealand, ²Univ. of California, La Jolla, CA, ³Univ. of Vermont, Burlington, VT

6:00 Introductory remarks
6:15 Secretary's report
6:30 Treasurer's report
6:45 **1845** Robert L. and Louise B. Jeanne Social Wasp Research Grant recipient: Production of nestmate recognition cues in a paper wasp. **Andrew W. Legan** (andrew.w.legan@vanderbilt.edu), Cornell Univ., Ithaca, NY
6:55 **1846** William L. and Ruth D. Nutting Termite Research Grant recipient: Visualization of the termite brain. **Austin Merchant** (ajme232@g.uky.edu), Univ. of Kentucky, Lexington, KY
7:05 Other business
7:35 Concluding remarks

Organized Meeting: Korean Young Entomologists (KYE)

Room 127 (America's Center)

Moderators and Organizers: June-Sun "Sunny" Yoon¹, Sang-Bin Lee² and Dong-Hwan Choe³, ¹Cornell Univ., Ithaca, NY, ²Univ. of Florida, Davie, FL, ³Univ. of California, Riverside, CA

6:00 **1847** Systematic study of subfamily Lachninae Herrich-Schaeffer, 1854 (Hemiptera: Aphididae) in the Korean Peninsula. **Minho Lee** (v2minmin@snu.ac.kr)¹, Seunghwan Lee¹, Hwalran Choi² and Hong-Yul Seo³, ¹Seoul National Univ., Seoul, South Korea, ²Univ. of Memphis, Germantown, TN, ³National Institute of Biological Resources, Incheon, South Korea
6:10 **1848** Systematic study of the family Eurytomidae Walker, 1832 (Hymenoptera: Chalcidoidea) from South Korea. **Duk-Young Park** (dypark91@snu.ac.kr), Seoul National Univ., Seoul, South Korea
6:20 **1849** Spatial distribution and association analysis of a prey-predator system: Case study of *Tetranychus urticae* and *Phytoseiulus persimilis* in strawberry greenhouses. **Hyo Jin Jeong** (hyojh9902@gmail.com), Gyeongsang National Univ., Jinju, South Korea
6:30 **1850** A plant virus manipulates host plant selection by its insect vector. **Hyoseok Lee** (hyslee@ucdavis.edu), Univ. of California, Davis, CA
6:40 **1851** Identification of carbamate, organophosphate, and pyrethroid target genes in *Haemaphysalis longicornis* using transcriptome analysis. **KyungHwan Moon** (mkh630@naver.com), Kyungpook National Univ., Sangju, South Korea
6:50 **1852** Future threats by the Formosan subterranean termite in the Korean Peninsula. **Sang-Bin Lee** (lsb5162@ufl.edu), Univ. of Florida, Davie, FL
7:00 Break

7:10 **1853** Molecular phylogeny of the family Oecophoridae with evolutionary hypothesis. **Sora Kim** (s.kim.micolepi@gmail.com) and Seunghwan Lee, Seoul National Univ., Seoul, South Korea

7:25 **1854** Insecticide resistance mechanism and integrated resistant management (IRM) of Noctuidae pests. **Ju Il Kim** (forweek@korea.kr), National Institute of Crop Science, Pyeongchang, South Korea

7:40 **1855** New biocide regulation in South Korea on household and public insecticides. **Jun-Hyung Tak** (jhtak@snu.ac.kr), Seoul National Univ., Seoul, South Korea

7:55 **1856** Chemical ecology perspective on the management of fruit and biting flies. **Gwang Hyun Roh** (roh.gwanghyun82@gmail.com), USDA - ARS, Hilo, HI

8:10 Concluding remarks

Student Awards Ceremony

America's Ballroom (America's Center)

Moderator: Jocelyn Holt, Texas A&M Univ., College Station, TX

6:30 PM - 7:30 PM

Organized Meeting: North American Dipterists Society (NADS) Meeting

Room 125 (America's Center)

Moderators and Organizers: Torsten Dikow¹ and Matthew Bertone², ¹Smithsonian Institution, National Museum of Natural History, Washington, DC, ²North Carolina State Univ., Raleigh, NC

7:00 Introductory remarks
7:10 **1857** The obscure and overlooked 'micro-Dolichopodidae'. **Justin Runyon** (jrunyon@fs.fed.us), USDA - Forest Service, Bozeman, MT
7:25 **1858** Neandersquitoes: Back to the future. **Erica McAlister** (e.mc.alister@nhm.ac.uk), Natural History Museum, London, United Kingdom
7:40 **1859** Preliminary results of a tick-borne pathogen survey of deer keds in Pennsylvania. **Michael Skvarla** (mskvarla36@gmail.com)¹, Erika Machtlinger¹, Amanda Jones² and Karen Poh¹, ¹Pennsylvania State Univ., University Park, PA, ²Walter Reed Army Institute of Research, Silver Spring, MD
7:55 **SP1860** Reduced silkmoth parasitism by *Compsilura concinnata* in New England. **Alex Baranowski** (alexbaran74@uri.edu)¹, Evan L. Preissler¹, George Boettner², Joseph Elkinton² and Catherine Conroy¹, ¹Univ. of Rhode Island, Kingston, RI, ²Univ. of Massachusetts, Amherst, MA
8:05 **SP1861** Investigations of the Mycetophilidae of North Central Nevada. **Robin Gray** (sevenvalleysent@gmail.com), Seven Valleys LLC, Winnemucca, NV
8:15 **SP1862** When is describing single unique specimens acceptable? A historical perspective from the calyptate Diptera. **Gregory A. Dahlem** (dahlem@niku.edu), Northern Kentucky Univ., Highland Heights, KY
8:25 **SP1863** Flying in the dark: Conservation of Hawaiian flies with limited data. **Karl Magnacca** (knm956@gmail.com), Army Natural Resources Program, Schofield Barracks, HI

Tuesday, November 19

Presentations: Poster/Infographic Displays

8:35 Discussion
8:50 Concluding remarks

Organized Meeting: Society of Overseas Nepalese Entomologists Meeting

Room 126 (America's Center)

Moderators and Organizers: Govinda Shrestha¹, Sudip Gaire² and Sulochana Paudyal³, ¹Oregon State Univ., Hermiston, OR, ²Purdue Univ., West Lafayette, IN, ³Oklahoma State Univ., Stillwater, OK

7:00 Welcoming remarks
7:05 Introductory remarks
7:10 **1864** Past, present, and future directions of SONE. **Ram B. Shrestha** (shrestrb@iastate.edu), Iowa State Univ., Ames, IA
7:25 2-3 minute student presentations
7:55 Break
8:00 Panel discussion for professional development
8:25 Student award ceremony
8:35 Business meeting
8:55 Concluding remarks

Organized Meeting: The Coleopterists Society General Meeting

Room 130 (America's Center)

Moderators and Organizers: Robert S. Anderson and Andrew B. T. Smith, Canadian Museum of Nature, Ottawa, ON, Canada

8:00 Introductory remarks
8:05 **1865** Beetles and biogeography of a great southern land. **Nicole Gunter** (ngunter@cmnh.org), Cleveland Museum of Natural History, Cleveland, OH
8:50 Question and answer
9:05 Annual General Meeting of The Coleopterists Society

WEDNESDAY, NOVEMBER 20, 2019

Infographic: All Sections 2

Exhibit Hall 1 & 2 (America's Center)

D3477 Ants as soil ecosystem engineers. **Madison Sankovitz** (madison.sankovitz@email.ucr.edu), Univ. of California, Riverside, CA

D3478 Distribution of *Frankliniella occidentalis* (Thysanoptera, Thripidae) in East Algerian crops. **Sabah Razi** (sabah_razi@yahoo.fr), Univ. of Biskra, Biskra, Algeria

D3479 Handy design tools to help you survive the Antlion Pit Competition. **Marianne Alleyne** (vanlaarh@illinois.edu) and Aimy Wissa, Univ. of Illinois, Champaign, IL

D3480 Host plants but not host races modulate the gut microbiota of *Spodoptera frugiperda*. **Nathalia Oliveira** (nathaliaoliveira@usp.br) and Fernando Luis Cônsoli, Univ. de São Paulo, Piracicaba, Brazil

D3481 Seasonal prevalence of maize thrips and incidence of maize chlorotic mottle virus in Taiwan. Feng-Chyi Lin¹, **Yi-Ju Chen** (yiju1986@gmail.com)^{1,2} and Ting-Ching Deng¹, ¹Taiwan Agricultural Research Institute, Taichung City, Taiwan, ²Univ. of Georgia, Griffin, GA

D3482 Semiochemical mediating interactions in the tritrophic system: Rose, western flower thrips, and minute pirate bug. **Marco Díaz** (marco.diaz@unimilitar.edu.co), Daniel Rodriguez and Luis Cubillos-Quijano, Univ. Militar Nueva Granada, Cajicá, Colombia

D3483 Survey of insects in the Kinnickinnic River Watershed: Helping local conservation groups identify areas of special concern for protection. **Kevyn Juneau** (kevyn.juneau@uwr.edu), Kendra Letch, Evelyn Ostrowski and Madison Bush, Univ. of Wisconsin, River Falls, WI

D3484 Characterizing two tropical embiopteran species: Nano- and micro-scale features of silk, silk spinning behavior, and environmental correlates of their distributions. **Janice S. Edgerly** (jedgerlyrooks@scu.edu), Keilyn Ing, René Harper, Edward Rooks and Richard Barber, Santa Clara Univ., Santa Clara, CA

D3485 'Tis the season: Temporal effects on aquatic macroinvertebrates in an Oklahoma cold-water tailrace. **Melissa Reed** (mleath@okstate.edu), James Long and W. Wyatt Hoback, Oklahoma State Univ., Stillwater, OK

D3486 Converting vacant lots from blight to bright. **Emily Trejo Sypolt** (trejosypolt.1@osu.edu) and Mary Gardiner, The Ohio State Univ., Columbus, OH

D3487 Science, education, and outreach through the NASA GLOBE observer mosquito habitat mapper. **Russanne Low** (rusty_low@strategies.org)¹, Heather Mortimer² and Theresa Schwerin¹, ¹Institute for Global Environmental Strategies, Arlington, VA, ²NASA Goddard Space Flight Center, Greenbelt, MD

D3488 A comparison of bollworm mortality in different Bt technologies. **Abdul Hakeem** (abdul.hakeem@ag.tamu.edu), Megha N. Parajulee and Dol Dhakal, Texas A&M AgriLife Research and Extension Center, Lubbock, TX

D3489 Predatory efficacy of *Amblyseius swirskii* and effect of *Beauveria bassiana* against the banana red rust thrips, *Chaetanaphothrips signipennis*, under laboratory and screenhouse conditions. **Myriam Arias de Lopez** (myriarias@yahoo.com.mx)¹, Elena Corozo-Ayovi¹, Ricardo Delgado², Belen Ramos² and Charles Staver¹, ¹Biodiversity International, Guayaquil, Ecuador, ²Instituto Nacional de Investigaciones Agropecuarias, Virgen de Fátima, Ecuador

D3490 Analyzing how *Wolbachia* infection in *Aedes albopictus* alters its intraspecific competition. **Cecilia Canizela** (cccaniz@ilstu.edu)¹, Diniz Ferreira², Molly Schumacher³, Ben Sadd¹, Jose Luis Ramirez³ and Steven Juliano¹, ¹Illinois State Univ., Normal, IL, ²Univ. Federal de Pelotas, Pelotas, Brazil, ³USDA - ARS, Peoria, IL

D3491 Advocating entomology in the regulatory arena: Innovative test methods for veterinary pest management products. **Katherine Groff** (katherineg@peta.org), PETA, Norfolk, VA

D3492 Mathematical simulation of fine-scale mosquito host-finding using a multidimensional gradient approach. **Andrew Guinness** (aaguinness@gmail.com), Iowa State Univ., Ames, IA

D3493 Mosquito and tick prevention around the home. **James Kopco** (james.kopco@gmail.com), Guardian Pest Solutions, Superior, WI

Presentations: Poster/Infographic Displays

Poster: MUVE 2

Exhibit Hall 1 & 2 (America's Center)

D3494 Baculovirus IE2 interacts with viral DNA through Daxx to generate an organized nuclear body structure for gene activation.

Sung-Chan Wei (nerv.lilith@gmail.com) and Yu-Chan Chao, Academia Sinica, Taipei, Taiwan

D3495 High throughput automated counting and measuring of insects. **Scott Campbell** (scott@ovipost.com), Ovipost, LaBelle, FL

D3496 Efficacy of a sequential application of granular fire ant bait and contact/residual insecticides to control red imported fire ants.

Kelly M. Loftin (kloftin@uaex.edu)¹ and John D. Hopkins², ¹Univ. of Arkansas, Fayetteville, AR, ²Univ. of Arkansas, Little Rock, AR

D3497 Natural sugar feeding in *Aedes aegypti* and *Culex quinquefasciatus* in Puerto Rico. **Ryan Hemme** (rhemme@cdc.gov), Gilberto Felix, Damaris Rodriguez, Marta Diaz Garcia, Angela Harris and Roberto Barrera, Centers for Disease Control and Prevention, San Juan, PR

D3498 Seasonal biting pattern of *Chrysops* spp. in Orlu zone of Imo state in Nigeria. **Nkeiruka Orji** (nmorji@yahoo.com)¹ and Zinachidinma Orji², ¹Chukwuemeka Odumegwu Ojukwu Univ., Uli, Nigeria, ²Odumegwu Ojukwu Univ., Owerri, Nigeria

D3499 A survey of multiple ixodid tick species for presence of RNA viruses. **Abby Levitt** (levitt@findlay.edu), Kristen Huseman and Kylie Miller, Univ. of Findlay, Findlay, OH

D3500 Characterizing *Wolbachia* infections in mosquitoes of the Central Valley of California. **Andrea Joyce** (ajoyce2@ucmerced.edu)¹, Ryan Torres¹, Eunis Hernandez¹ and Jose Ramirez², ¹Univ. of California, Merced, CA, ²USDA - ARS, Peoria, IL

D3501 Mortality of mosquito (*Aedes aegypti*) larvae by entomopathogenic fungi. **Cindy Minutti-Hernandez** (cimayer@hotmail.com) and Sergio Sanchez- Peña, Univ. Autónoma Agraria Antonio Narro, Saltillo, CU, Mexico

D3502 Efficacy against mosquitoes following small unmanned aerial system applications of Imperium™ Insecticide in Florida and California. **Jing Zhai** (jingzhai@eurofins.com), Ming Huang and Neta Wicker, Eurofins Agroscience Services LLC, Prospect Hill, NC

D3503 Multi-state military surveillance for the Asian longhorned tick (*Haemaphysalis longicornis* Neumann) with opportunistic tick and pathogen detection. **Meagan Marshall** (meagan.c_marshall.civ@mail.mil), Zachary Vincent, Benedict Pagac and Melissa Miller, Public Health Command - Atlantic, Fort George G. Meade, MD

D3504 Tick-borne diseases and tick vectors on white tailed deer (*Odocoileus virginianus*) in south Texas. **Don Thomas** (donald.thomas@ars.usda.gov)¹ and Pia Olafson², ¹USDA - ARS, Edinburg, TX, ²USDA - ARS, Kerrville, TX

D3505 Efficacy of Triethylamine as anesthetic agent to immobilize *Anopheles dirus* females for inducing copulation by vaporizer method. **Siriporn Phasomkusolsil** (siripornp@afirms.org), Orawan Wongnet, Jaruwan Tawong, Kanchana Pantuwatana, Nantaporn Monkanna, Tanaporn Kornkan, Katherine Poole-Smith, Silas Davidson and Wesley McCardle, Armed Forces Research Institute of Medical Sciences, Bangkok, Thailand

D3506 Liquid perimeter treatments with and without granular exterior bait for management of odorous house ants, *Tapinoma sessile* (Say). **Karen M. Vail** (kvail@utk.edu) and Jennifer G. Chandler, Univ. of Tennessee, Knoxville, TN

D3507 Diversity and composition of midgut microbiota of *Aedes albopictus* in central Illinois depends on land use type and locality.

Chang-Hyun Kim (maraychk@illinois.edu)¹, Megan Cooper², Antony Oluoch², Thomas Canam² and Chris Stone¹, ¹Illinois Natural History Survey, Champaign, IL, ²Eastern Illinois Univ., Charleston, IL

D3508 Factors modulating captures of gravid females of *Aedes aegypti* (Diptera: Culicidae) in the field. **Roberto Barrera** (amz9@cdc.gov), Veronica Acevedo and Manuel Amador, Centers for Disease Control and Prevention, San Juan, PR

D3509 Lessons learned when initiating a multi-county insecticide resistance survey in Texas. **Thalia Rios** (thalia.rios02@utrgv.edu)¹ and Christopher Vitek², ¹Univ. of Texas, Edinburg, TX, ²Univ. of Texas Rio Grande Valley, Edinburg, TX

D3510 Moribund and insect bioassay(s): Biological and regulatory implications. Steven R. Sims¹, Marla J. Eva² and **Arthur G. Appel** (appelag@auburn.edu)², ¹Blue Imago, LLC, Maryland Heights, MO, ²Auburn Univ., Auburn, AL

D3511 CREB-binding protein regulates the cross-talk between the juvenile hormone and ecdysone signaling pathways in the yellow fever mosquito, *Aedes aegypti*. **Sharath Chandra Gaddelapati** (sharathgsc@uky.edu), Ramesh Dhandapani and Subba Reddy Palli, Univ. of Kentucky, Lexington, KY

D3512 Efficacy and repellency of some essential oils and their blends against larval and adult house flies, *Musca domestica* L. (Diptera: Muscidae). **Christopher Geden** (chris.geden@ars.usda.gov)¹ and Hanem Khater², ¹USDA - ARS, Gainesville, FL, ²Benha Univ., Touck, Egypt

Poster: PBT 2

Exhibit Hall 1 & 2 (America's Center)

D3513 Differential expression analysis of olfactory genes based on a combination of sequencing platforms and behavioral investigations in *Aphidius gifuensis*. **Jia Fan** (ifan@ippcaas.cn) and Julian Chen, Institute of Plant Protection Chinese Academy of Agricultural Sciences, Beijing, China

D3514 Strengths and limitations of *Bacillus thuringiensis galleriae* for managing Japanese beetle (*Popillia japonica*) adults and grubs with caveats for cross-order activity to monarch butterfly (*Danaus plexippus*) larvae. Carl T. Redmond¹, Lindsey Wallis¹, Matthew Geis¹, Robert Williamson² and **Daniel Potter** (dapotter@uky.edu)¹, ¹Univ. of Kentucky, Lexington, KY, ²Univ. of Wisconsin, Madison, WI

D3515 Life-history traits of cabbage aphids, *Brevicoryne brassicae*, exposed to CropCoat™ treated cabbage seedlings. **Matheus G P de M Ribeiro** (mribeiro@crop-enhancement.com), Damian Hajduk and Eric Flora, Crop Enhancement, Inc, San Jose, CA

D3516 The efficacy of a hemp-seed pesticide (HDX) in controlling houseflies (*Musca domestica*) by disrupting development. **Marina Better** (mbetter1@broncos.uncfsu.edu) and Shirley Chao, Fayetteville State Univ., Fayetteville, NC

D3517 Multiple point mutations of ryanodine receptor confer. **Jingmei Huang** (huangjmswu@163.com), Shunfan Wu and Congfen Gao, Nanjing Agricultural Univ., Nanjing, China

D3518 Beyond pounds on the ground: Measuring toxicity of insecticide treatments in agroecosystems. **Joe Ballenger** (jballeng@uwyo.edu) and Andrew Kniss, Univ. of Wyoming, Laramie, WY

D3519 Nutrient regulation in the invasive berry pest *Drosophila suzukii*. **Carrie Deans** (dean0179@umn.edu)¹ and William D. Hutchison², ¹Univ. of Minnesota, Minneapolis, MN, ²Univ. of Minnesota, St. Paul, MN

Presentations: Poster/Infographic Displays

D3520 RNAi based functional study of a horizontally transferred carotenoids desaturase gene in pea aphid. **Bi-yue Ding** (biyueding@163.com), Southwest Univ., Chongqing, China

D3521 Molecular and functional characterization of three odorant-binding proteins from the wheat blossom midge, *Sitodiplosis mosellana*. **Keyan Zhu-Salzman** (ksalzman@tamu.edu), Texas A&M Univ., College Station, TX

D3522 Bee Risk Assessment for pesticides and seeds – similarities and differences. **Bridget O'Neill** (bridget.o-neill@corteva.com)¹ and Chad Boeckman², ¹Corteva Agriscience, Indianapolis, IN, ²Corteva Agriscience, Johnston, IA

D3523 Transcriptome and gene expression analysis in different developmental stages of the coffee berry borer, *Hypothenemus hampei* (Coleoptera: Curculionidae: Scolytinae). Daniel Noriega¹, Paula Arias², Helena Barbosa^{3,4}, Fabricio Arreaga¹, Gustavo Ossa², Bernardo Villegas², Roberta Coelho⁵, Erika Albuquerque⁵, Roberto Togawa³, Priscila Grynberg⁵, Haichuan Wang⁶, Ana Vélez⁶, Jorge Arboleda^{7,8}, Maria Grossi-de-Sa³, Maria Silva⁵ and **Arnubio Valencia** (arnubio.valencia@ucaldas.edu.co)², ¹Univ. of Brasilia, Brasilia, Brazil, ²Univ. de Caldas, Manizales, Colombia, ³Embrapa Recursos Genéticos e Biotecnologia, Brasília, Brazil, ⁴Univ. Federal do Rio Grande do Sul, Porto Alegre, Brazil, ⁵Embrapa, Brasília, Brazil, ⁶Univ. of Nebraska, Lincoln, NE, ⁷Univ. de Manizales, Manizales, Colombia, ⁸Centro de Bioinformática y Biología Computacional de Colombia, Manizales, Colombia

D3524 Presentation withdrawn

D3525 Developing insecticide resistance in populations of glassy-winged sharpshooter (*Homalodisca vitripennis*) in California's Central Valley. **Richard Redak** (richard.redak@ucr.edu), Frank J. Byrne and Jason Stajich, Univ. of California, Riverside, CA

D3526 Genome-wide analysis of microRNAs in relation to ovary development in *Bactrocera dorsalis*. **Qiang Zhang** (zqhzwh@163.com), Southwest Univ., Chongqing, China

D3527 Mass rearing by masculinization using *Tra2* RNA interference and sterile insect release technique of the striped fruit fly, *Zeugodacus scutellata*. **Yonggyun Kim** (hosanna@anu.ac.kr), Andong National Univ., Andong, South Korea

D3528 Contest versus scramble competition: A comparison of feeding vibrations of seed beetle larvae. **Adan Deeb** (ande224@g.uky.edu), Allyssa Kilanowski, Josiah Ritchey and Charles Fox, Univ. of Kentucky, Lexington, KY

D3529 Toward implementation of mosquito sterile insect technique. **Immo Hansen** (immo@nmsu.edu), New Mexico State Univ., Las Cruces, NM

D3530 Genome of the tarnished plant bug, *Lygus lineolaris*. **Omaththage Perera** (op.perera@ars.usda.gov), USDA - ARS, Stoneville, MS

D3531 SEM and light microscopy of the fat body and digestive system in overwintering Colorado potato beetle, *Leptinotarsa decemlineata* (Coleoptera: Chrysomelidae). Doga Cedden¹, Gözde Güney¹, Damla Amutkan², Zekiye Suludere² and **Umut Toprak** (utoprak@agri.ankara.edu.tr)¹, ¹Ankara Univ., Ankara, Turkey, ²Gazi Univ., Ankara, Turkey

D3532 Evaluation of Rotundial as a contact irritant and spatial repellent against adult mosquitoes. Leticia Recla, Sarah Profitt, Madison Dirks, Kyle Kinnunen, Isaac Li, Kevin Golovin and **Mark Rheault** (mark.rheault@ubc.ca), The Univ. of British Columbia, Kelowna, BC, Canada

D3533 Plastic degradation in caterpillars of the greater waxworm (*Galleria mellonella*) and the route to metabolic effects. **Harald Grove** (grovehc99@brandou.ca), Christophe LeMoine and Bryan Cassone, Brandon Univ., Brandon, MB, Canada

Poster: P-IE 2

Exhibit Hall 1 & 2 (America's Center)

D3534 Entomopathogenic fungi associated with the Asian citrus psyllid, *Diaphorina citri*, populations in Florida. **Louela A. Castrillo** (louela.castrillo@ars.usda.gov)¹, David G. Hall² and Matthew G. Hentz², ¹USDA - ARS, Ithaca, NY, ²USDA - ARS, Fort Pierce, FL

D3535 Presentation withdrawn

D3536 Volatile changes in plant leaf niches and soybean vein necrosis virus titers may modulate *Neohydatothrips variabilis* feeding preference. **Asifa Hameed** (akh5405@psu.edu)¹, Cristina Rosa¹ and Edwin Rajotte², ¹Pennsylvania State Univ., University Park, PA, ²Pennsylvania State Univ., University Park, PA

D3537 Impact of cover crop species on the biodiversity of slug natural enemies in soybean. T. J. Fedirko, William Cissel and **Ivan Hiltbold** (hiltbold@udel.edu), Univ. of Delaware, Newark, DE

D3538 Foraging behavior and interaction of *Gryon* sp. and *Trissolcus hyalinipennis*, parasitoids of Bagrada bug eggs. **Nastaran Tofangsazi** (nastaran.tofangsazi@ars.usda.gov)¹, Paul Pratt² and Brian Hogg², ¹Univ. of California, Davis, CA, ²USDA - ARS, Albany, CA

D3539 Preferential parasitism of *Ooencyrtus* sp. near *telenomicida* (Hymenoptera: Encyrtidae) on *Bagrada hilaris* regardless of rearing host. **Fatemeh Ganjisaffar** (fatemeh.ganjisaffar@ucr.edu), Nancy Power and Thomas M. Perring, Univ. of California, Riverside, CA

D3540 Evaluation of selected biopesticides on the sweetpotato whitefly, *Bemisia tabaci* (Hemiptera: Aleyrodidae). **Omotola Olaniyi** (omotola.olaniyi@ars.usda.gov) and Alvin Simmons, USDA - ARS, Charleston, SC

D3541 Is the gall midge *Orseolia javanica* (Diptera: Cecidomyiidae) a potential biological control agent for the invasive cogongrass, *Imperata cylindrica*, in the southeastern US? **James Cuda** (jcuda@ufl.edu)¹, William A. Overholt² and Purnama Hidayat³, ¹Univ. of Florida, Gainesville, FL, ²Univ. of Florida, Fort Pierce, FL, ³Bogor Agricultural Univ., Bogor, Indonesia

D3542 Suppression of the sugarcane aphid by parasitoids on aphid susceptible and partially resistant sorghum. **Ashleigh Faris** (ashleigh.faris@ag.tamu.edu)¹, Norman Elliott² and Michael Brewer¹, ¹Texas A&M AgriLife Research, Corpus Christi, TX, ²USDA - ARS, Stillwater, OK

D3543 Interactions between antifungal plant pathogen resistance mechanisms and *Beauveria bassiana* in maize. **Patrick Dowd** (patrick.dowd@ars.usda.gov) and Eric Johnson, USDA - ARS, Peoria, IL

D3544 Molecular gut content analysis of predation by arthropods on the dubas bug, *Ommatissus lybicus* (Hemiptera: Tropiduchidae) in date palms in Oman. **Eric Chapman** (eric.chapman@uky.edu)¹, Salim Al-Khatiri², Abdel Moktar³, Kacie Athey¹ and John Obrycki¹, ¹Univ. of Kentucky, Lexington, KY, ²Directorate General of Agricultural and Livestock Research, Seeb, Oman, ³Ministry of Agriculture and Fisheries, Muscat, Oman

Presentations: Poster/Infographic Displays

D3545 Evaluating temporal continuity of prey resources for predatory lady beetles (Coccinellidae) in Wisconsin agricultural landscapes. **Benjamin Juliano** (bjuliano@wisc.edu)¹, Tania N. Kim², Brian Spiesman², David Hoekman³ and Claudio Gratton¹, ¹Univ. of Wisconsin, Madison, WI, ²Kansas State Univ., Manhattan, KS, ³Southern Nazarene Univ., Bethany, OK

D3546 Slugs and bugs: The thugs of soybean communities. **Matthew Longmire** (mlongmir@vols.utk.edu)¹, Jerome Grant¹, Scott Stewart² and Virginia Sykes¹, ¹Univ. of Tennessee, Knoxville, TN, ²Univ. of Tennessee, Jackson, TN

D3547 Evaluating botanical powders to control maize weevil, *Sitophilus zeamais* Motschulsky (Coleoptera: Curculionidae), in stored sorghum grain. Hame Abdou Kadi Kadi^{1,2} and **Bonnie Pendleton** (bpPENDLETON@wtamu.edu)², ¹Institut National de la Recherche Agronomique du Niger, Niamey, Niger, ²West Texas A&M Univ., Canyon, TX

D3548 Single and combined effects of an herbicide and an insecticide on the predatory insects of experimental paddies: The importance of predator microhabitat use. **Koya Hashimoto** (atrophaneura4@gmail.com), Yuji Eguchi and Daisuke Hayasaka, Kindai Univ., Nara, Japan

D3549 Selection of trap plant to *Metcalfa pruinosa* (Say) (Homoptera: Flatidae). **YongSeok Choi** (yschoi92@korea.kr), Chuncheongnamdo Agricultural Research & Extension Services, Yesan, South Korea

D3550 Abundance of natural enemies in soybeans. **Kaushalya Amarasekare** (kaushalya2641@yahoo.com) and Richard Link, Tennessee State Univ., Nashville, TN

D3551 Assessing the host range of the North American parasitoid *Ontsira mellipes*: Potential for biological control of Asian longhorned beetle. **Xingeng Wang** (xingeng.wang@ars.usda.gov)¹, Ellen M. Aparicio¹, Theresa Murphy², Jian Duan¹, Joseph Elkinton³ and Juli Gould², ¹USDA - ARS, Newark, DE, ²USDA - APHIS, Buzzards Bay, MA, ³Univ. of Massachusetts, Amherst, MA

D3552 Efficacy of selected pesticidal plants on insect pests of cowpea. **Barbara Amoah** (bamoaah@sccsu.edu)¹, Steven Belmain² and Philip Stevenson², ¹South Carolina State Univ., Orangeburg, SC, ²Univ. of Greenwich, Chatham, United Kingdom

D3553 Requiem, a plant-derived terpene product as an effective tool for controlling sucking pests. **Donglan Tian** (donglan.tian@bayer.com)¹ and Matthew Tarver², ¹Bayer Crop Science, West Sacramento, CA, ²Bayer Crop Science, Monheim am Rhein, LA, Germany

D3554 Effect of trunk injection time and tree size on the control of black pine bast scale, *Matsucoccus thunbergianae*, in Japanese black pine forest. Tae-Young Kim¹, Hyun-guk Kim¹, In-hoo Choi¹, Yoon Suk Choi¹, Faisal Kabir¹, **DongWoon Lee** (whitegrub@knu.ac.kr)¹, Yong-hwa Choi¹ and Dong Soo Kim², ¹Kyungpook National Univ., Sangju, South Korea, ²National Institute of Forest Science, Jinju, South Korea

D3555 Occurrence and distribution patterns of insect pests in the smart-farm and greenhouse with tomato plants. Byeong Jin Kim and **Young Nam Youn** (youngnam@cnu.ac.kr), Chungnam National Univ., Daejeon, South Korea

D3556 Field survey of *Diabrotica* in South Dakota maize fields. **Bradley McManus** (bradley.mcmanus@sdstate.edu) and Billy Fuller, South Dakota State Univ., Brookings, SD

D3557 *Aphelinus nigritus* as a key component to a sugarcane aphid regulatory system in a large acreage production region of the southern reaches of the U.S. Great Plains. **Michael Brewer** (mjbrewer@ag.tamu.edu)¹, Ashleigh Faris¹, Blake Elkins¹ and James Woolley², ¹Texas A&M AgriLife Research, Corpus Christi, TX, ²Texas A&M Univ., College Station, TX

D3558 Comparisons of economic impacts of insect control in cotton with transgenic varieties versus synthetic insecticide. Shoil Greenberg¹, **Thomas Sappington** (tom.sappington@ars.usda.gov)² and John Adamczyk³, ¹USDA - ARS (retired), Weslaco, TX, ²USDA - ARS, Ames, IA, ³USDA - ARS, Poplarville, MS

D3559 The IR-4 program: Assisting specialty crop growers with pest management. **Janine Spies** (jrazze@ufl.edu), Univ. of Florida, Gainesville, FL

D3560 Developing methods to collect, process, and screen indigenous fungal strains that naturally attack the ACP in the Lower Rio Grande Valley. **Jonathan Cisneros** (jonathan.cisneros@usda.gov)¹, Justin Wendel¹, Johnny Rodriguez¹, Stefan Jaronski², Christopher Vitek³ and Daniel Flores¹, ¹USDA - APHIS, Edinburg, TX, ²USDA - ARS (retired), Sidney, MT, ³Univ. of Texas Rio Grande Valley, Edinburg, TX

D3561 Determining relative infectivity/virulence (= efficacy) of selected entomopathogenic fungi against ACP using spray exposure bioassays. **Justin Wendel** (justin.l.wendel@usda.gov)¹, Jonathan Cisneros¹, Johnny Rodriguez¹, Stefan Jaronski², Christopher Vitek³ and Daniel Flores¹, ¹USDA - APHIS, Edinburg, TX, ²USDA - ARS (retired), Sidney, MT, ³Univ. of Texas Rio Grande Valley, Edinburg, TX

D3562 Portable devices for detecting stress-induced volatile emissions to assess tree vulnerability to attack by ambrosia beetles. **Christopher Ranger** (christopher.ranger@ars.usda.gov)¹, Peter B. Schultz² and Michael Reding¹, ¹USDA - ARS, Wooster, OH, ²Virginia Polytechnic Institute and State Univ., Virginia Beach, VA

D3563 Life history and natural enemies of cannabis aphid, an insect newly recognized in North America associated with industrial hemp. **Melissa Schreiner** (melissa.schreiner@rams.colostate.edu), Erika Peirce and Whitney Cranshaw, Colorado State Univ., Fort Collins, CO

D3564 An ecological model to identify arthropod species for risk assessment of genetically modified Bt soybean in South Africa. **Nadine Schutte** (nadineschutte2@gmail.com) and Johnnie Van den Berg, North-West Univ., Potchefstroom, South Africa

D3565 Effects of soil water levels on cabbage, *Plutella xylostella*, and *Trichogramma pretiosum*. **Sergio De Bortoli** (bortoli@fcav.unesp.br)¹, Dagmara Ramalho², Diego Silva³, Caroline De Bortoli¹ and Rafael Santos¹, ¹Univ. Estadual Paulista, Jaboticabal, Brazil, ²Univ. de São Paulo, Ribeirão Preto, Brazil, ³Univ. de São Paulo, Piracicaba, Brazil

D3566 Areawide suppression of European corn borer after 23 years in Minnesota and Wisconsin: The benefits of Bt maize continue. **Anthony Hanson** (hansons4022@umn.edu)¹, Bruce Potter², Eric C. Burkness¹, Roger Moon¹, Krista Hamilton³, Paul D. Mitchell⁴ and William D. Hutchison¹, ¹Univ. of Minnesota, St. Paul, MN, ²Univ. of Minnesota, Lamberton, MN, ³Wisconsin Dept. of Trade, Agriculture, and Consumer Protection, Madison, WI, ⁴Univ. of Wisconsin, Madison, WI

D3567 Requiem - A biological insecticide that delivers effective control against sucking pests and is an effective tool in integrated pest management programs. **Sek Yee Tan** (seykee.tan@bayer.com)¹, Matthew Tarver², Nicholas Wright³, Karl Muenks⁴ and Kolappan Esaki Muthu⁴, ¹Bayer Crop Science, West Sacramento, CA, ²Bayer Crop Science, Monheim am Rhein, LA, Germany, ³Bayer Crop Science, Raleigh, NC, ⁴Bayer Crop Science, Monheim am Rhein, Germany

Presentations: Poster/Infographic Displays

D3568 Rearing *Eucosma gigantanea* (Lepidoptera: Tortricidae), a newly designated pest of *Silphium integrifolium*. **Nervah Cheremond** (cheremond@landinstitute.org) and Ebony Murrell, The Land Institute, Salina, KS

D3569 Preference and development of *Plutella xylostella* (L.) (Lepidoptera: Plutellidae) in kale submitted to different levels of water in the soil. **Rafael Santos** (rsdosantos.rs@gmail.com)¹, Dagmara Ramalho², Caroline De Bortoli¹ and Sergio De Bortoli¹, ¹Univ. Estadual Paulista, Jaboticabal, Brazil, ²Univ. de São Paulo, Ribeirão Preto, Brazil

D3570 Mechanisms of insecticide resistance in diamondback moth, *Plutella xylostella*. **David Riley** (dgr@uga.edu)¹, Donald Champagne², Thomas Dunn² and John Bennett¹, ¹Univ. of Georgia, Tifton, GA, ²Univ. of Georgia, Athens, GA

D3571 Spacial and temporal patterns of ambrosia beetle attacks on nursery trees. **Nadeer Youssef** (nyoussef@blomand.net)¹, Jason Oliver¹, Christopher Ranger², Karla Addesso¹, Michael Reding² and Paul O'Neal¹, ¹Tennessee State Univ., McMinnville, TN, ²USDA - ARS, Wooster, OH

D3572 Impact of pest management paradigm and red imported fire ant, *Solenopsis invicta* Buren, abundance on arthropod pest density in peanut. **Mark R. Abney** (mrabney@uga.edu) and Kent Hill, Univ. of Georgia, Tifton, GA

D3573 The *Periglandula*-Convolvulaceae symbiosis affects suitability of plants to the psyllid *Bactericera maculipennis*. **Navneet Kaur** (navneet.kaur2@ars.usda.gov)¹, William Rodney Cooper¹, Jennifer Duringer², Arash Rasheed³, Ismael E. Badillo-Vargas⁴, Gabriela Esperanza-Díaz⁵ and David R. Horton¹, ¹USDA - ARS, Wapato, WA, ²Oregon State Univ., Corvallis, OR, ³Univ. of Idaho, Moscow, ID, ⁴Texas A&M Univ., College Station, TX, ⁵Ameristem, Inc, Camarillo, CA

D3574 Efficacy of essential oils for control of *Frankliniella occidentalis* (Thysanoptera: Thripidae) in greenhouses. **Tiffany Durr** (durr@landinstitute.org) and Ebony Murrell, The Land Institute, Salina, KS

D3575 Integrated release method for *Trichogramma ostriniae*. **Jeffrey Cluever** (cluever.jeffrey@huskers.unl.edu)¹, Robert Wright², Nevin Lawrence¹ and Jeffrey Bradshaw¹, ¹Univ. of Nebraska, Scottsbluff, NE, ²Univ. of Nebraska, Lincoln, NE

D3576 Impacts of bollworm susceptibility to Cry1Ac on survival and damage to Bt cottons in large field cages. **Nathan Little** (nathan.little@ars.usda.gov), Blake Elkins, Michelle Mullen, Omaththage Perera, Katherine Parys and K. Clint Allen, USDA - ARS, Stoneville, MS

D3577 Evaluation of integrated and structured refuge plans for delaying Bt toxin resistance in populations of the western bean cutworm (*Striacosta albicosta*). **Katharine Swoboda Bhattacharai** (kswoboda3@unl.edu)¹, Brad Coates², Julie Peterson¹, Craig A. Abel², Sarah Zukoff³ and Thomas Hunt⁴, ¹Univ. of Nebraska, North Platte, NE, ²USDA - ARS, Ames, IA, ³Kansas State Univ., Garden City, KS, ⁴Univ. of Nebraska, Concord, NE

D3578 Performance of insecticides against tarnished plant bug, *Lygus lineolaris*, (Palisot de Beauvois) in midsouth cotton. **Dung Bao** (db3@entomology.msstate.edu)¹, Angus Catchot¹, Jeff Gore², Don Cook², Gus Lorenz³, Scott Stewart⁴, Sebe Brown⁵, Ben Thrash¹, Nick Bateman⁶, Whitney Crow¹, Cori Speights¹, Tyler Towles¹ and Ryan Mann⁷, ¹Mississippi State Univ., Mississippi State, MS, ²Mississippi State Univ., Stoneville, MS, ³Univ. of Arkansas, Lonoke, AR, ⁴Univ. of Tennessee, Jackson, TN, ⁵Louisiana State Univ., Winnsboro, LA, ⁶Univ. of Arkansas, Monticello, AR, ⁷Mississippi State Univ., Starkville, MS

D3579 Efficacy of soil-drench applications of flonicamid for control of vegetable pests. **Adam Alford** (adamalford@vt.edu)¹, Hélène Doughty², Christopher Philips³ and Thomas Kuhar¹, ¹Virginia Polytechnic Institute and State Univ., Blacksburg, VA, ²Virginia Polytechnic Institute and State Univ., Painter, VA, ³ISK Biosciences, Concord, OH

D3580 Biocontrol with benefits: Enhancing sustainability by adding value. **Camila Oliveira-Hofman** (camila.hofman@ars.usda.gov)¹, Brett Blaauw², Dario Chavez³, Larry Duncan⁴, Ganpati Jagdale², Gregory Colson², Clive Bock¹ and David Shapiro-Ilan¹, ¹USDA - ARS, Byron, GA, ²Univ. of Georgia, Athens, GA, ³Univ. of Georgia, Griffin, GA, ⁴Univ. of Florida, Lake Alfred, FL

D3581 Does soil water condition for broccoli plants affect *Plutella xylostella* development? **Caroline De Bortoli** (cplacidi@utk.edu)¹, Dagmara Ramalho², Rafael Santos¹ and Sergio De Bortoli¹, ¹Univ. Estadual Paulista, Jaboticabal, Brazil, ²Univ. de São Paulo, Ribeirão Preto, Brazil

D3582 Optimizing a microbial insecticide in pecan orchards: Can it be efficacious for multiple pests? **Camila Oliveira-Hofman** and **David Shapiro-Ilan** (david.shapiro@ars.usda.gov), USDA - ARS, Byron, GA

D3583 Mechanisms of potato psyllid resistance to neonicotinoid insecticides. **Mahnaz Kiani** (mahnaz.kianifariz@ag.tamu.edu) and Adrianna Szczepaniec, Texas A&M AgriLife Research, Amarillo, TX

D3584 Edamame pest research at Virginia Tech. **Kemper Sutton** (klsutton@vt.edu)¹, Thomas Kuhar¹, Steve Rideout², Jill Pollok³ and Hélène Doughty², ¹Virginia Polytechnic Institute and State Univ., Blacksburg, VA, ²Virginia Polytechnic Institute and State Univ., Painter, VA, ³Eastern Shore Agricultural Research and Extension Center, Painter, VA

D3585 Initial assessment of Cry10 protein expression for resistance of cotton plants to boll weevil. **José Miranda** (jose-ednilson.miranda@embrapa.br)¹, Tatianne Abreu-Jardim¹, Augusto Batista¹, Edson Hirose², Bruna Tripode¹, Nívia Bonavigo¹ and Laís Santos¹, ¹Embrapa Algodão, Santo Antônio de Goiás, Brazil, ²Embrapa Soja, Santo Antonio de Goiás, Brazil

D3586 Climate match of two biological control agents (*Ceutorhynchus* spp.) prioritized for release to control garlic mustard (*Alliaria petiolata*) in North America. **Mary Marek-Spartz** (patt0335@umn.edu), George Heimpel and Roger Becker, Univ. of Minnesota, St. Paul, MN

D3587 Screening predatory beetles for presence of DNA from thousand cankers disease complex members. **William Klingeman** (wklingem@utk.edu)¹, Grace Pietsch¹, Sarah Boggess¹, Romina Gazis² and Denita Hadziabdic¹, ¹Univ. of Tennessee, Knoxville, TN, ²Univ. of Florida, Homestead, FL

D3588 Population genomic analysis of navel orangeworm (*Amyelois transitella*) in California's Central Valley. **Jacob Wenger** (jawenger@csufresno.edu)¹ and Chuck Burks², ¹California State Univ., Fresno, CA, ²USDA - ARS, Parlier, CA

D3589 Performance of Bayer CRW II and CRW III pyramids against *Diabrotica* spp. in prospective Bt-resistance situations in Minnesota. **Kenneth Ostlie** (ostli001@umn.edu) and Edwin Benkert III, Univ. of Minnesota, St. Paul, MN

D3590 Sugarcane aphid management in sorghum in Haiti: Effect of intercropping and bioinsecticides. **Wilfrid Calvin**¹, **Julien Beuzelin** (jbeuzelin@ufl.edu)¹, Oscar Liburd², Marc Branham² and Ludger Jean Simon³, ¹Univ. of Florida, Belle Glade, FL, ²Univ. of Florida, Gainesville, FL, ³American Univ. of the Caribbean, Les Cayes, Haiti

Presentations: Poster/Infographic Displays

D3591 Economic injury levels for *Oebalus poecilus* (Heteroptera: Pentatomidae) in rice. **José Alexandre Barrigossi** (jose.barrigossi@embrapa.br), Embrapa Arroz e Feijão, Santo Antônio de Goiás, Brazil

D3592 Establishment and local dispersal of the arundo wasp and arundo armored scale released for biological control of arundo in northern California. **Patrick Moran** (patrick.moran@ars.usda.gov)¹, Ellyn Bitume², John A. Goolsby³ and D. Valle Rogers¹, ¹USDA - ARS, Albany, CA, ²USDA - Forest Service, Hilo, HI, ³USDA - ARS, Edinburg, TX

D3593 Effects of plastic groundcovers on mobility of swede midge. **Gabriel LeMay** (glemay@uvm.edu)¹, Christy Hoepting² and Yolanda Chen¹, ¹Univ. of Vermont, Burlington, VT, ²Cornell Cooperative Extension, Albion, NY

D3594 Growth potential of *Helicoverpa zea* populations from the Florida Panhandle in pyramided cotton expressing *Bacillus thuringiensis* toxins. **Marcelo Rabelo** (mmendesrabelo@ufl.edu)¹, Silvana Paula-Moraes¹, Blair Siegfried² and Eliseu Pereira³, ¹Univ. of Florida, Jay, FL, ²Univ. of Florida, Gainesville, FL, ³Univ. Federal de Viçosa, Viçosa, Brazil

D3595 Investment trade-off between tonic immobility and mate searching in sweetpotato weevil, *Cylas formicarius* (Coleoptera: Brentidae). **Ouyang Haoyong** (ouyanghaoyong@ioz.ac.cn)¹, Runzhi Zhang² and Muhammad Haseeb¹, ¹Florida A&M Univ., Tallahassee, FL, ²Chinese Academy of Sciences, Beijing, China

D3596 Late-season *Lygus* management in Texas cotton. Megha N. Parajulee¹, **Abdul Hakeem** (abdul.hakeem@ag.tamu.edu)¹ and Ram B. Shrestha², ¹Texas A&M AgriLife Research and Extension Center, Lubbock, TX, ²Iowa State Univ., Ames, IA

D3597 Understanding the relationship between brown marmorated stink bug and industrial hemp. **Kadie Britt** (kadieb@vt.edu), Mika Pagani and Thomas Kuhar, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

D3598 Continued survey of wood-boring beetle composition in Connecticut forests. **Alicia Bray** (brayalic@gmail.com) and Niklas Lowe, Central Connecticut State Univ., New Britain, CT

D3599 Efficacy of insecticide rotations for management of sweetpotato whitefly in cucurbit crops in southern Georgia. **Alton Sparks** (asparks@uga.edu) and Ryan Weredyk, Univ. of Georgia, Tifton, GA

D3600 Efficacy of Surtivo Soy against *Helicoverpa zea* and *Chrysodeixis includens* in soybeans. **Scott Graham** (sgraham@agbitech.com)¹ and Paula Marcon², ¹AgBiTech, Southaven, MS, ²AgBiTech, Elkton, MD

D3601 Scouting and management of redheaded flea beetles, *Styphlonychus frontalis*, at nurseries in the mid-Atlantic. **Brian Kunkel** (bakunkel@udel.edu)¹, Hélène Doughty² and Peter B. Schultz³, ¹Univ. of Delaware, Newark, DE, ²Virginia Polytechnic Institute and State Univ., Painter, VA, ³Virginia Polytechnic Institute and State Univ., Virginia Beach, VA

D3602 The parasitoid complex on *Bagrada hilaris* eggs in northeastern Mexico. **Moises Felipe-Victoriano** (tauro.250499@gmail.com)¹, Elijah Talamas² and Sergio Sanchez- Peña¹, ¹Univ. Autónoma Agraria Antonio Narro, Saltillo, CU, Mexico, ²Florida Dept. of Agriculture and Consumer Services, Gainesville, FL

D3603 Assessment of new products and formulations for organic management of spotted-wing drosophila. **Ashfaq Sial** (ashsial@uga.edu), Craig Roubos, Joseph Disi and Jamal Hunter, Univ. of Georgia, Athens, GA

D3604 Release and evaluation of *Tamarixia radiata* for managing Asian citrus psyllid in commercial citrus. **Jawwad Qureshi** (jawwadq@ufl.edu), Univ. of Florida, Immokalee, FL

D3605 Residual activity of insecticides applied to soybean foliage for control of insect pests in Illinois. **Nicholas Seiter** (nseiter@illinois.edu) and Ashley Decker, Univ. of Illinois, Champaign, IL

D3606 Adventive populations of *Tetramesa romana* and *Rhizapidiotus donacis* and their potential to be biocontrol agents of *Arundo donax* in the Santa Clara River system. **Ellen Hollstien** (ehollstien@gmail.com) and Adam Lambert, Univ. of California, Santa Barbara, CA

D3607 Larval movement of *Helicoverpa zea* in seed blends of non-Bt and Bt corn containing Agrisure Viptera® traits. **Marcelo Dimase** (mdimases@lsu.edu)¹, Isaac/Olatunji Oyediran², Sebe Brown³, Wade Walker³, Jianguo Guo¹, Wenbo Yu¹ and Fangneng Huang¹, ¹Louisiana State Univ., Baton Rouge, LA, ²Syngenta Biotechnology Inc, Research Triangle Park, NC, ³Louisiana State Univ., Winnsboro, LA

D3608 Two new entomopathogenic fungi infecting *Diaphorina citri* Kuwayama (Hemiptera: Liviidae) in Mexico. Santos Díaz-Martínez¹, **Margarita Lavin-Maya** (mlavinmaya@hotmail.com)², Raúl Rodríguez-Guerra³ and J. Isabel López-Arroyo³, ¹Colegio de Postgraduados, Texcoco, Mexico, ²Univ. Tecnológica de Izúcar de Matamoros, Izúcar de Matamoros, PU, Mexico, ³Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias, General Terán, Mexico

D3609 Effect of storage on the biological development of *Telenomus podisi* (Platygastridae), reared in *Oebalus insularis* eggs (Pentatomidae), at reduced temperature. **Bruno Zachrisson** (bazzalam@gmail.com), Pedro Osorio, Onesio Martinez and Guadalupe Gutierrez, Instituto de Investigación Agropecuaria de Panamá, Panama City, Panama

D3610 Comparison of insect populations in four varieties of avocado (*Persea americana*) 'Wilson,' 'Don Ramón,' 'Butler,' and 'Russell' in northwestern Puerto Rico. **Karina Rosario-Mendez** (karina.rosario2@upr.edu), Univ. of Puerto Rico, Mayagüez, PR

D3611 Evaluation of the relative suitability of selected varieties of edible amaranths as hosts for leafhoppers and other major insect pests. Donald Brooks, Franklin Quarcoo, Desmond Mortley, Conrad Bonsi, Daniel Abugri, Wendall McElhenney and **Sonu Koirala B. K.** (skoirala4947@tuskegee.edu), Tuskegee Univ., Tuskegee, AL

D3612 Presentation withdrawn

D3613 Hyperparasitoids on soybean aphids in North America: Thelytoky in the hyperparasitoid *Alloxysta brevis* cured with antibiotics. **Jonathan Dregni** (dreg0005@umn.edu)¹, Alice Casiraghi², Mar Ferrer Suay² and George Heimpel¹, ¹Univ. of Minnesota, St. Paul, MN, ²Universitat de València, Burjassot, Spain

D3614 Compatibility of entomopathogenic fungus, *Isaria fumosorosea* with *Curinus coeruleus* for biological control of the Florida red scale under laboratory conditions. Jessamyn Adorada¹, **Pasco Avery** (pbavery@ufl.edu)¹, Emily Duren¹, Alejandra Chavez¹, Ronald Cave¹ and Jawwad Qureshi², ¹Univ. of Florida, Fort Pierce, FL, ²Univ. of Florida, Immokalee, FL

D3615 Efficacy of the biopesticide Majestene (*Burkholderia* spp.) for control of wireworm (Coleoptera: Elateridae) in potatoes. **Mika Pagani** (mika396@vt.edu)¹, Thomas Kuhar¹ and Hélène Doughty², ¹Virginia Polytechnic Institute and State Univ., Blacksburg, VA, ²Virginia Polytechnic Institute and State Univ., Painter, VA

Presentations: Poster/Infographic Displays

D3616 Broflanilide: A new insecticide seed treatment for wheat. Jeremiah Mullock, **Ruhiiyah DyrdaHL-Young** (ruhiyih.dyrdaHL-young@basf.com), Justin Clark and H. Alejandro Arevalo, BASF Corporation, Research Triangle Park, NC

D3617 Beneficial insect populations in primocane blackberries bordered by native perennial plants or pasture and treated with biologically based insecticides. **Karen Friley** (karen.friley@kysu.edu)¹, John Sedlacek¹, Sathya Govindasamy¹, Mamata Bashyal², Eddie Slusher², Megan McCoun¹ and Jill Fisk¹, ¹Kentucky State Univ., Frankfort, KY, ²Univ. of Georgia, Tifton, GA

D3618 Effectiveness of two traps to document *Helicoverpa zea* moth emergence. **Tyler Shaw** (tshaw@ufl.edu)¹, Silvana Paula-Moraes², Dominic Reisig³ and Francis Reay-Jones⁴, ¹Univ. of Florida, Milton, FL, ²Univ. of Florida, Jay, FL, ³North Carolina State Univ., Plymouth, NC, ⁴Clemson Univ., Florence, SC

D3649 Developmental timing determines the consequences of high temperatures for host-parasitoid interactions. **M. Elizabeth Moore** (melmoore@live.unc.edu), Christina A. Hill and Joel Kingsolver, Univ. of North Carolina, Chapel Hill, NC

D3650 Assessing causes of larval mortality: A key component of wheat stem sawfly (*Cephus cinctus* Norton) management. **Buddhi Achhami** (buddhi.achhami@montana.edu)¹, Gadi Reddy², Robert Peterson¹, Jamie Sherman¹ and David Weaver¹, ¹Montana State Univ., Bozeman, MT, ²Montana State Univ., Conrad, MT

D3652 Extrafloral nectaries and associated nutrients: Importance for braconid parasitoids. **Laissa Cavallini dos Santos** (l.cavallinidossantos@montana.edu), Lilianna M. B. Bento, Dayane A. Reis, Robert Peterson and David Weaver, Montana State Univ., Bozeman, MT

D3653 Comparative assessment of host preference and oviposition behaviors of *Cephus cinctus* (Hymenoptera: Cephidae) using wheat and smooth brome. **Rekha Bhandari** (rekha.bhandari@student.montana.edu), Megan L. Hofland, Tracy M. Sterling and David Weaver, Montana State Univ., Bozeman, MT

D3654 Characterizing the pine wilt disease pathosystem in the Front Range of Colorado. **David Atkins** (david.atkins@colostate.edu), Colorado State Univ., Fort Collins, CO

D3655 Wild bees are crucial for pollination services of sunflower in Colorado rangelands. **Khum Thapa-Magar** (khum.thapa_magar@colostate.edu) and Seth Davis, Colorado State Univ., Fort Collins, CO

D3656 Redheaded flea beetle: A major insect pest of nursery production systems. **Nathan Herrick** (nherrick@ksu.edu) and Raymond Cloyd, Kansas State Univ., Manhattan, KS

D3657 Cover crop legacies alter AMF colonization and resistance to chewing herbivores in maize. **Elizabeth Davidson-Lowe** (exd33@psu.edu)¹, Ebony Murrell², Swayamjit Ray¹ and Jason Kaye¹, ¹Pennsylvania State Univ., University Park, PA, ²The Land Institute, Salina, KS

D3659 Dose response of field populations of alfalfa weevil to lambda-cyhalothrin using feeding assay. **Ayman Mostafa** (ayman@email.arizona.edu), Marisa Noble, Lauren Tomlin and Kyle Harrington, Univ. of Arizona, Phoenix, AZ

Poster: SysEB 2

Exhibit Hall 1 & 2 (America's Center)

D3619 First report of *Megaphragma* sp. (Hymenoptera: Trichogrammatidae), an egg parasitoid of *Chaetanaphothrips signipennis* and *Frankliniella parvula* in Ecuador. **Myriam Arias de Lopez** (myriarias@yahoo.com.mx)¹, Elena Corozo-Ayovi¹, Daysy Moyón², Belén Ramos², Ricardo Delgado², Charles Staver¹ and Andrew Polaszek³, ¹Biodiversity International, Guayaquil, Ecuador, ²Instituto Nacional de Investigaciones Agropecuarias, Virgen de Fátima, Ecuador, ³Natural History Museum, London, United Kingdom

D3620 A taxonomic revision of the Chinese weevil species belonging to *Tychius* Germar (Coleoptera: Curculionidae). **Chunyan Jiang** (jiangchunyan@ioz.ac.cn), Chinese Academy of Sciences, Beijing, China

D3621 Spatial sorting of behavior and life-history traits: An environmental manipulation approach to determine traits correlated with dispersal behavior. **Allyssa Kilanowski** (allyssa.kilanowski@gmail.com), David Westneat and Charles Fox, Univ. of Kentucky, Lexington, KY

D3622 Genetic analysis of the fungal community resident in *Asphondylia borrichiae* (Diptera: Cecidomyiidae) galls. **Frances Nagle** (fsnagle@outlook.com), Dale Casamatta and Anthony Rossi, Univ. of North Florida, Jacksonville, FL

D3623 Biogeography and functional genetics of thermal tolerance across latitude and elevation in montane bumble bees. **Jeffrey Lozier** (jlozier@ua.edu)¹, Jason Jackson¹, Meaghan Pimsler¹, Kennan Oyen², James Herndon³, Michael Dillon² and James Strange⁴, ¹Univ. of Alabama, Tuscaloosa, AL, ²Univ. of Wyoming, Laramie, WY, ³Utah State Univ., Logan, UT, ⁴USDA - ARS, Logan, UT

D3624 Development of a novel mass spectral signature library and analysis approach for the identification of arthropods. **Javier Sanchez-Galan** (javier.sanchezgalan@utp.ac.pa)^{1,2}, Fernando Merchan¹, Alejandro Almanza², Rolando Gittens³ and Jose Loaiza², ¹Univ. Tecnologica de Panama City, Panama, Panama, ²INDICASAT AIP, Ciudad del Saber, Panama, ³INDICASAT AIP, Panama City, Panama

D3625 Molecular study of *Calliptamus barbarus* (Costa 1836) (Orthoptera: Acrididae, Calliptaminae). Are the two forms considered subspecies or new species? **Rouibah Moad** (rouibah@yahoo.com)¹ and Lopez Lopez², ¹Univ. of Jijel, Jijel, Algeria, ²Univ. of Murcia, Murcia, Spain

D3626 The Dynastinae (Coleoptera: Scarabaeidae) of Ecuador: Update. **Ronald Cave** (rdcave@ufl.edu)¹, Brett Ratcliffe² and Aura Paucar-Cabrera³, ¹Univ. of Florida, Fort Pierce, FL, ²Univ. of Nebraska, Lincoln, NE, ³Univ. Nacional de Loja, Loja, Ecuador

D3627 Presentation withdrawn

D3628 The Living Soil: An outreach experience with elementary school students to identify soil invertebrates. **Sandra Arango-Caro** (sarango-caro@danforthcenter.org), Terry Woodford-Thomas and Kristine Callis-Duehl, Donald Danforth Plant Science Center, St. Louis, MO

D3629 Predicting potential distribution of *Lycorma delicatula* (Hemiptera: Fulgoridae) using the MaxEnt model in South Korea. **Hyeban Namgung** (nghb0425@gmail.com)¹, Min-Jung Kim², Sunghoon Baek², Joon-Ho Lee² and Hyojoong Kim¹, ¹Kunsan National Univ., Gunsan, South Korea, ²Seoul National Univ., Seoul, South Korea

D3630 Presentation withdrawn

Presentations: Poster/Infographic Displays

D3631 Population structure of the holarctic chironomid *Cricotopus sylvestris* across a broad geographic gradient. **Susan Gresens** (sgresens@towson.edu)¹, Torbjørn Ekrem², Elisabeth Stur² and Colleen Winters¹, ¹Towson Univ., Towson, MD, ²Norwegian Univ. of Science and Technology, Trondheim, Norway

D3632 Variable coevolutionary histories for the specialized gut symbionts of Cephalotes turtle ants. **Jacob Russell** (jar337@drexel.edu)¹, Jon G. Sanders², Christian Cabuslay¹, John Wertz³, Scott Powell⁴ and Corrie Moreau², ¹Drexel Univ., Philadelphia, PA, ²Cornell Univ., Ithaca, NY, ³Calvin College, Grand Rapids, MI, ⁴The George Washington Univ., Washington, DC

D3633 Seasonal occurrence of adult carabid beetles (Coleoptera: Carabidae) in West-Central Illinois. **Kenneth W. McCravy** (kw-mccravy@wiu.edu)¹ and Jason Willard², ¹Western Illinois Univ., Macomb, IL, ²Missouri Southern State Univ., Joplin, MO

D2634 Presentation withdrawn

D3635 Phylogeography of carpenter ants from the California Channel Islands: An evolutionary reconstruction based on phylogenomics. **Ida Naughton** (inaughto@ucsd.edu)¹, Philip Ward², Maria Tonione³, Neil Tsutsui³ and David Holway⁴, ¹Univ. of California, La Jolla, CA, ²Univ. of California, Davis, CA, ³Univ. of California, Berkeley, CA, ⁴Univ. of California, San Diego, CA

D3636 Revitalization of the arachnid holdings housed in the invertebrate collections at the Carnegie Museum of Natural History: Collection contents and its potential for future scientific study. **Catherine Giles** (giles@carnegiemnh.org), Carnegie Museum of Natural History, Pittsburgh, PA

D3637 Presentation withdrawn

D3638 Partner choice and fidelity in fungus farming ants. **Katrin Kellner** (antkatrina@gmail.com) and Jon Seal, Univ. of Texas, Tyler, TX

D3639 A molecular analysis of nearctic specimens in the genus *Phyllodesma*, Hubner [1820] (Lepidoptera: Lasiocampidae). **Vanessa Verdecia** (verdeciav@carnegiemnh.org), Carnegie Museum of Natural History, Pittsburgh, PA

D3640 DNA methylation and the evolution of duplicate genes in a social insect. **Carl Dyson** (cdyson3@gatech.edu) and Michael Goodisman, Georgia Institute of Technology, Atlanta, GA

D3641 Presentation withdrawn

D3642 Identification of *Spodoptera* larvae intercepted at U.S. ports of entry. Alicia Timm¹, **Luke Tembrock** (tembrock@colostate.edu)¹, Frida Zink¹ and Todd Gilligan², ¹Colorado State Univ., Fort Collins, CO, ²USDA - APHIS, Fort Collins, CO

D3643 Drones, the forgotten caste: The evolution of male genes in Corbiculate bees with special emphasis on the honey bees (*Apis mellifera*). **Garett Slater** (slater20@purdue.edu)¹, Krispn Given¹ and Brock Harpur², ¹Purdue Univ., West Lafayette, IN, ²York Univ., Toronto, ON, Canada

D3644 What's the point of being shiny if nobody can see you? Effects of diffraction gratings on friction and wettability of beetle cuticles. Kristen Reiter¹, Lihua Wei¹, Alison Dunn¹, Thomas McElrath² and **Marianne Alleyne** (vanlaarh@illinois.edu)¹, ¹Univ. of Illinois, Champaign, IL, ²Illinois Natural History Survey, Champaign, IL

D3645 Glacier Creek Preserve Insect Survey: An insect biodiversity study in a reclaimed prairie ecosystem. **Iris Munoz-Ortiz** (imunoz-ortiz3641@csm.edu)¹, Lisa Cuba¹, Karen Murch-Shafer², Bradley Carlson² and Amanda Roe¹, ¹College of Saint Mary, Omaha, NE, ²Univ. of Nebraska, Omaha, NE

D3646 Intraspecific variation and behavior in bumble bees: Population-level consequences. **Matthew Austin** (mwacpb@mail.umsl.edu) and Aimee Dunlap, Univ. of Missouri, St. Louis, MO

D3647 Discovering species and multitrophic interactions associated with *Piper* (Piperaceae) in the Peninsula of Yucatán (México). **Diego F. Campos-Moreno** (dfcampos@ecosur.edu.mx)¹, Lee A. Dyer², Carmen Pozo¹, Gabriela Pérez-Lachaud¹, James Whitfield³, Scott R. Shaw⁴, Edgard E. Palacio-Goenaga⁵, Michael Gates⁶, Gérard Delvare⁷, John Stireman⁸, Tara Massad⁹ and Eric Tepe¹⁰, ¹El Colegio de la Frontera Sur, Chetumal, Mexico, ²Univ. of Nevada, Reno, NV, ³Univ. of Illinois, Champaign, IL, ⁴Univ. of Wyoming, Laramie, WY, ⁵CORPIOCA, Barranquilla, Colombia, ⁶USDA - ARS, Washington, DC, ⁷INRA - CIRAD, Montpellier, France, ⁸Wright State Univ., Dayton, OH, ⁹Gorongosa National Park, Mozambique, ¹⁰Univ. of Cincinnati, Cincinnati, OH

D3648 A review on subfamily Mantispinae Enderlein, 1910 (Insecta: Neuroptera) from India. **Simarjit Kaur** (simarjit485@gmail.com), Manpreet Singh Pandher, K. Rajmohana and Kailash Chandra, Zoological Survey of India, Kolkata, India

D3651 Investigating the effects of predator exclusion on dung and carrion beetles. **Kelsea Young** (kelseay@g.clemson.edu)¹, Jessica Hartshorn¹, Kier Klepzig², Michael Caterino¹ and Thomas Sheehan², ¹Clemson Univ., Clemson, SC, ²The Jones Center at Ichauway, Newton, GA

D3658 Drivers of diversification in *Polistes* paper wasps. **Sara E. Miller** (sem332@cornell.edu) and Michael Sheehan, Cornell Univ., Ithaca, NY

D3660 Ontogeny of CHC phenotypes in the paper wasp *Polistes fuscatus*. **Andrew W. Legan** (awl75@cornell.edu) and Michael Sheehan, Cornell Univ., Ithaca, NY

Virtual Posters: All Sections 2

Exhibit Hall 1 & 2 (America's Center)

VP63 Crowdsourced photographs as an effective tool for large-scale passive tick surveillance. **Heather L. Kopsco** (hkopsco@uri.edu)¹, Guang Xu², Chu-Yuan Luo², Stephen Rich² and Thomas N. Mather¹, ¹Univ. of Rhode Island, Kingston, RI, ²Univ. of Massachusetts, Amherst, MA

VP64 Utilization of hospital inpatient record databases for analyzing trends in vector-borne and parasitic diseases of importance in medical entomology: A case study of Nevada, 2013-2017. **Chad Cross** (chad.cross@unlv.edu), Univ. of Nevada, Las Vegas, NV

VP65 Acknowledgement of entomologists' vital role in a successful national malaria elimination campaign 100 years ago and how this holds promise for eliminating malaria in 2020. **Florence Dunkel** (fdunkel@montana.edu)¹ and Anton Alexander², ¹Montana State Univ., Bozeman, MT, ²Supreme Court of England (Retired), London, United Kingdom

VP66 Chemical stressors and honey bee immunity. **Scott O'Neal** (soneal3@unl.edu) and Troy Anderson, Univ. of Nebraska, Lincoln, NE

VP67 New chemistries for acaricide resistance management of Varroa mites. **Leslie Rault** (lrault2@unl.edu) and Troy Anderson, Univ. of Nebraska, Lincoln, NE

VP68 Modulatory effect of waste products and oil from mullet roes on the behavior and lipid profile of the medfly *Ceratitis capitata* (Wiedemann) (Diptera: Tephritidae). Antonella Rosa, Alessandra Piras, Gianfranca Carta and **Carla Masala** (omasala@unica.it), Univ. of Cagliari, Monserrato, Italy

Oral Presentations

12:15 Lunch (provided for all registered participants)

1:15 Small group discussions of next steps related to the high priority issues

2:15 Afternoon coffee break

2:45 Discussions to facilitate potential future collaborations

3:30 Report back to plenary

MUVE Section Symposium: Emerging and Neglected Infectious Diseases: Innovative Vector Research

Room 120 (America's Center)

Moderators and Organizers: Baldwyn Torto and David Tchouassi, International Centre of Insect Physiology and Ecology (icipe), Nairobi, Kenya

9:00 **1876** Arbovirus disease risk through the prism of the vector: A rewarding approach. **Rosemary Sang** (rsang@icipe.org), International Centre of Insect Physiology and Ecology (icipe), Nairobi, Kenya

9:30 **1877** Malaria mosquitoes are attracted to and utilize cattle urine as a nutrient resource. **Rickard Ignell** (rickard.ignell@slu.se), Swedish Univ. of Agricultural Sciences, Alnarp, Sweden

9:45 **1878** Extent and sources of herbivory in dengue vectors. **Caroline Kungu** (ckungu@icipe.org), International Centre of Insect Physiology and Ecology (icipe), Nairobi, Kenya

10:00 **1879** Discovery of novel plant-based biopesticides for mosquito control. **Ephantus Muturi** (ephantus.muturi@ars.usda.gov), USDA - ARS, Peoria, IL

10:15 **1880** Tritrophic interaction: Biting fly-trypanosome-domestic animal interactions. **Merid Getahun** (mgetahun@icipe.org), John Ngiela, Peter Ahuya, Jackson Mbithi, Daniel Masiga and Baldwyn Torto, International Centre of Insect Physiology and Ecology (icipe), Nairobi, Kenya

10:30 **1881** Arbovirus risk assessment in sandflies. **David Tchouassi** (dtchouassi@icipe.org), International Centre of Insect Physiology and Ecology (icipe), Nairobi, Kenya

10:45 Break

10:55 **1882** Understanding sandfly chemical ecology in Baringo County, Kenya. **Baldwyn Torto** (btorto@icipe.org), International Centre of Insect Physiology and Ecology (icipe), Nairobi, Kenya

11:10 **SP1883** Effects of nectar phytochemicals on life-history traits of the invasive Asian tiger mosquito, *Aedes albopictus*. **Teresia Njoroge** (tnjorog2@illinois.edu), Univ. of Illinois, Champaign, IL

11:20 **SP1884** Presentation withdrawn

11:30 **SP1885** Can understanding and manipulating the seasonal biology of the West Nile vector, *Culex pipiens*, lead to novel control mechanisms? **Megan Meuti** (meuti.1@osu.edu) and Vivian Chang, The Ohio State Univ., Columbus, OH

11:40 **SP1886** Ticks home in on body heat: A new understanding of ectoparasitic host-seeking and repellent action. **Ann Carr** (ann.carr@vanderbilt.edu)^{1,2} and Vincent Salgado², ¹Vanderbilt Univ., Nashville, TN, ²BASF Corporation, Research Triangle Park, NC

MUVE Section Symposium: Vectors, Hosts, and Pathogens: Advocating Cross-System Dialog and Research in Entomology

Room 121 (America's Center)

Moderators and Organizers: Cynthia Lord¹, Christopher Vitek², Chelsea T. Smartt¹ and W. Braswell³, ¹Univ. of Florida, Vero Beach, FL, ²Univ. of Texas Rio Grande Valley, Edinburg, TX, ³USDA - ARS, Edinburg, TX

9:00 Introductory remarks

9:10 **1887** Does it matter who's infectious? Vertebrates, insects, ticks, and others in transmission dynamics. **Cynthia Lord** (clord@ufl.edu), Univ. of Florida, Vero Beach, FL

9:40 **1888** Control efforts and concerns in vector biology. **Christopher Vitek** (christopher.vitek@utrgv.edu)¹, Daniel Flores², Jason Tidwell³ and Heather Hernandez⁴, ¹Univ. of Texas Rio Grande Valley, Edinburg, TX, ²USDA - APHIS, Edinburg, TX, ³USDA - ARS, Edinburg, TX, ⁴Univ. of Texas, Edinburg, TX

9:55 **1889** Nematodes and vector-borne disease: The vectors and the vectored. **Edwin Lewis** (eelewis@uidaho.edu), Univ. of Idaho, Moscow, ID

10:10 **1890** Leveraging mosquito control data for ecological analyses. **Lindsay Campbell** (lcampbell2@ufl.edu)¹, Caroline Efstatthon², Nathan Burkett-Cadena¹, Bradley Eastmond¹ and Bryan Giordano¹, ¹Univ. of Florida, Vero Beach, FL, ²Anastasia Mosquito Control District of St. Johns County, St. Augustine, FL

10:25 Break

10:40 **1891** Understanding molecular mosquito vector-virus interactions: Could a cross-taxa approach be advantageous? **Chelsea T. Smartt** (ctsmart@ufl.edu), Univ. of Florida, Vero Beach, FL

10:55 **1892** From vector to treatment: New approaches to fight vectored disease. **W. Braswell** (evan.braswell@aphis.usda.gov), USDA - ARS, Edinburg, TX

11:10 **1893** Abscisic acid and cross-system stress signaling among mosquito, host, and parasite. **Shirley Luckhart** (slackhart@uidaho.edu), Reagan Haney, Cassandra Olds, Taylor Azizeh and Dean Taylor, Univ. of Idaho, Moscow, ID

11:25 **1894** Host finding and challenges faced by crop- and blood-feeding arthropods. **Sandra Allan** (sandy.allan@ars.usda.gov), USDA - ARS, Gainesville, FL

11:40 Discussion

P-IE Section Symposium: Advocating for Entomological Solutions to the Grand Challenge of Global Food Security in the 21st Century

Room 231 (America's Center)

Moderators and Organizers: Hannah Quellhorst¹ and William Morrison², ¹Kansas State Univ., Manhattan, KS, ²USDA - ARS, Manhattan, KS

9:00 Introductory remarks

9:05 **1895** Locust plagues: Working across boundaries, sectors, and disciplines to find solutions. **Ariane Cease** (acease@asu.edu), Arizona State Univ., Tempe, AZ

Oral Presentations

9:20 **1896** Maize post-harvest loss reduction for improved food security in the middle belt of Ghana. **George Opit** (george.opit@okstate.edu)¹, James Danso², Enoch A. Osekere², Naomi Manu³, Paul Armstrong⁴, Frank Arthur⁴, James Campbell⁴ and George Mbata⁵, ¹Oklahoma State Univ., Stillwater, OK, ²Kwame Nkrumah Univ. of Science and Technology, Kumasi, Ghana, ³Kansas State Univ., Manhattan, KS, ⁴USDA - ARS, Manhattan, KS, ⁵Fort Valley State Univ., Fort Valley, GA

9:35 **1897** Threats to food security: Forecasting risk from invasive insects using MaxEnt. **Amy Morey** (morey041@umn.edu)¹ and Robert Venette², ¹Univ. of Minnesota, St. Paul, MN, ²USDA - Forest Service, St. Paul, MN

9:50 **1898** Maize post-harvest loss reduction for improved food security in the northern part of Ghana. **Naomi Manu** (nmanu30@ksu.edu)¹, George Opit², James Danso³, Enoch A. Osekere³, Paul Armstrong², James Campbell² and George Mbata⁴, ¹Kansas State Univ., Manhattan, KS, ²USDA - ARS, Manhattan, KS, ³Kwame Nkrumah Univ. of Science and Technology, Kumasi, Ghana, ⁴Fort Valley State Univ., Fort Valley, GA

10:05 Break

10:15 **1899** Investigating the gut microbiome of the hairy fungus beetle: A novel approach for protecting the global corn supply. **Julius Eason** (eason2@purdue.edu), Peter Dunn, Laramy Enders, Michael Scharf, Charles Woloshuk and Linda Mason, Purdue Univ., West Lafayette, IN

10:30 **1900** Leveraging insect genomic resources to improve management of invasive and emerging agricultural pests. **Erin Scully** (erin.scully@ars.usda.gov), USDA - ARS, Manhattan, KS

10:45 **1901** The lesser mealworm, *Alphitobius diaperinus*: An important stored product pest or a valuable food source for humans and animals? **Christos Athanassiou** (athanassiou@agr.uth.gr), Christos Rumbos, Ioannis Karapanagiotidis and Eleni Mente, Univ. of Thessaly, Nea Ionia, Greece

11:00 Roundtable discussion

P-IE Section Symposium: Transmission Ecology of Vector-borne Phytopathogen

Room 263 (America's Center)

Moderators and Organizers: Ordom Brian Huot¹ and Yesenia Itzá Ángeles-López², ¹North Carolina State Univ., Raleigh, NC, ²Cinvestav Unidad Irapuato, Irapuato, Mexico

9:00 Welcoming remarks

9:05 **1902** Dissecting the ecological and molecular factors affecting wheat curl mite transmission of wheat streak mosaic virus. **Punya Nachappa** (punya.nachappa@colostate.edu), Tessa Albrecht and Priyanka Mittapelly, Colorado State Univ., Fort Collins, CO

9:20 **1903** Differences in whitefly gene expression associated with transmission of semipersistent and persistent viruses and application for virus and vector control. **William Wintermantel** (bill.wintermantel@ars.usda.gov)¹, Navneet Kaur¹, Daniel Hasegawa¹, Wenbo Chen², Zhangjun Fei³ and Kai-Shu Ling⁴, ¹USDA - ARS, Salinas, CA, ²Boyce Thompson Institute, Ithaca, NY, ³Cornell Univ., Ithaca, NY, ⁴USDA - ARS, Charleston, SC

9:35 **1904** Vector-virus interactions in non-persistently- and persistently-transmitted plant viruses. **Kiran Gadhave** (krgadhave@ncsu.edu)¹, Bhabesh Dutta² and Rajagopalbabu Srinivasan², ¹North Carolina State Univ., Raleigh, NC, ²Univ. of Georgia, Tifton, GA

9:50 **1905** It takes a lot of guts: Characterizing the early response to tomato spotted wilt virus infection in larval thrips. **Dorith Rotenberg** (drottenb@ncsu.edu), North Carolina State Univ., Raleigh, NC

10:05 **1906** Recent progress in the search for the elusive tospovirus receptor in thrips. **Anna Whitfield** (awhitfi@ncsu.edu), North Carolina State Univ., Raleigh, NC

10:20 **1907** Addressing whether there is a need for continued Asian citrus psyllid management under HLB stress.

Freddy Ibanez (fibanez@neo.tamu.edu), Gene Albrigo and Lukasz Stelinski, Univ. of Florida, Lake Alfred, FL

10:35 Break

10:45 **1908** Transmission of maize mosaic virus by *Peregrinus maidis*. **Ordom Huot** (obhuot@ncsu.edu) and Anna Whitfield, North Carolina State Univ., Raleigh, NC

11:00 **1909** Direct and indirect effects of an *Orthotospovirus* on its insect vector. **Rajagopalbabu Srinivasan** (babusri@uga.edu), Univ. of Georgia, Tifton, GA

11:15 **1910** Advances in the understanding of potato psyllid – ‘*Candidatus Liberibacter solanacearum*’ - plant interactions. **Cecilia Tamborindeguy** (ctamborindeguy@tamu.edu), Texas A&M Univ., College Station, TX

11:30 **1911** The SSA-1 Whitefly in East Africa, a key to understand how selective pressures linked to insect vectors produce new viral variants. **Gabriela Toomer** (gabriela.chavez@auburn.edu) and Alana Jacobson, Auburn Univ., Auburn, AL

11:45 **1912** *Candidatus Liberibacter solanacearum* a master manipulator of its insect vector *Bactericera cockerelli*? Yes and no: It all depends on the details! **Ismael E. Badillo-Vargas** (ismael.badillo@ag.tamu.edu)¹, Kyle Koch¹ and Estephanie Bernal Jimenez², ¹Texas A&M Univ., College Station, TX, ²Texas A&M AgriLife Research, Weslaco, TX

SysEB Section Symposium: 20 Years of Biological Survey in the Southern Appalachians: An Update on the Smokies All Taxa Biodiversity Inventory (ATBI)

Room 127 (America's Center)

Moderators and Organizers: William Kuhn¹, Todd Witcher², Becky Nichols³ and Paul Super⁴, ¹Discover Life in America, Knoxville, TN, ²Discover Life in America, Gatlinburg, TN, ³US National Park Service, Gatlinburg, TN, ⁴US National Park Service, Lake Junaluska, NC

9:00 **1913** Smokies ATBI: Beginnings and progress of this 20-year endeavor. **Becky Nichols** (becky_nichols@nps.gov)¹, Paul Super², Todd Witcher³ and William Kuhn⁴, ¹US National Park Service, Gatlinburg, TN, ²US National Park Service, Lake Junaluska, NC, ³Discover Life in America, Gatlinburg, TN, ⁴Discover Life in America, Knoxville, TN

9:15 **1914** Monitoring seasonality, distribution, and diversity of dung beetles in Great Smoky Mountains National Park. **Kimberly Sheldon** (ksheldon@utk.edu) and Margaret Mamantov, Univ. of Tennessee, Knoxville, TN

9:30 **1915** Mosquitoes of the southern Appalachians: Indigenous, invasive, and presumed transient species. **Brian Byrd** (bdbbyrd@wcu.edu)¹, C. Roxanne Connelly², Paul Super³ and Corey Day⁴, ¹Western Carolina Univ., Cullowhee, NC, ²Centers for Disease Control and Prevention, Fort Collins, CO, ³US National Park Service, Lake Junaluska, NC

9:45 Break

Oral Presentations

11:10 **SP1938** Entomopathogenic nematodes and their bacterial symbionts influence plant defenses and herbivore preference. **Anjel Helms** (amhelms@tamu.edu) and John Grunseich, Texas A&M Univ., College Station, TX

11:20 **SP1939** Trouble in the truffles: A surprising beetle threat to *Tuber melanosporum* in Australia. **Ainsley Seago** (ainsley.seago@dpi.nsw.gov.au), New South Wales Dept. of Primary Industries, Orange, NSW, Australia

11:30 **SP1940** The genome of the *Arsenophonus* endosymbiont of cowpea aphid (*Aphis craccivora*) provides insights into host plant specialization. **Jennifer White** (jenawhite@uky.edu)¹ and Justin Kratovil², ¹Univ. of Kentucky, Lexington, KY, ²Univ. of Connecticut, Storrs, CT

11:40 **SP1941** Effects of fungus volatiles on plant growth, defense, and herbivory. **Kevin Rice** (ricekev@missouri.edu)¹, Alyssa Lucas¹, Anjel Helms², Swayamjit Ray³, Chris Dardick⁴, Zhijian Li⁴ and Tracy C. Leskey⁴, ¹Univ. of Missouri, Columbia, MO, ²Texas A&M Univ., College Station, TX, ³Pennsylvania State Univ., University Park, PA, ⁴USDA - ARS, Kearneysville, WV

11:50 **SP1942** Fall armyworm-associated gut bacteria modulate plant defense responses. **Flor Acevedo** (floredith.acevedo@gmail.com)¹, Michelle Peiffer¹, Ching-Wen Tan¹, Jie Wang², Asher Jones¹, Kelli Hoover¹, Cristina Rosa¹, Dawn Luthe¹ and Gary Felton¹, ¹Pennsylvania State Univ., University Park, PA, ²Fujian Agriculture and Forestry Univ., Fuzhou, China

12:00 Concluding remarks

Member Symposium: Analyzing Insect Development, Where Do We Stand? Expansions and Limitations in the Field of Forensic Entomology

Room 266 (America's Center)

Moderators and Organizers: Lauren Weidner¹ and Travis Rusch², ¹Arizona State Univ., Glendale, AZ, ²Texas A&M Univ., College Station, TX

9:00 Introductory remarks

9:05 **1943** Genomic approaches to understanding development rate variation in blow flies. **Anne Andere** (aaandere@iupui.edu)¹, Christina Martin¹, Aaron Tarone² and Christine Picard¹, ¹Indiana Univ.-Purdue Univ., Indianapolis, IN, ²Texas A&M Univ., College Station, TX

9:20 **1944** Development and survival of *Lucilia sericata* Meigen, and *Phormia regina* Meigen (Diptera: Calliphoridae) at constant temperatures. **Krystal Hans** (krystal.r.hans@gmail.com)¹ and Sherah L. VanLaerhoven², ¹Purdue Univ., West Lafayette, IN, ²Univ. of Windsor, Windsor, ON, Canada

9:35 **1945** Together or apart: Is mixed species development always a competition? **Sherah L. VanLaerhoven** (vanlaerh@uwindsor.ca), Univ. of Windsor, Windsor, ON, Canada

9:50 **1946** Artificial selection on *Cochliomyia macellaria* (Fabricius) (Diptera: Calliphoridae) development time: Evolutionary ecology, medical, veterinary, and forensic implications. **Jonathan Parrott** (jonathan.parrott@asu.edu)¹, Ernesto Ramos III², David Riley², Meaghan Pimsler³, J. Spencer Johnston², Clifford Spiegelman², Christine Picard⁴ and Aaron Tarone², ¹Arizona State Univ., Glendale, AZ, ²Texas A&M Univ., College Station, TX, ³Univ. of Alabama, Tuscaloosa, AL, ⁴Indiana Univ.-Purdue Univ., Indianapolis, IN

10:05 **1947** Development responses of a forensically important blow fly (*Cochliomyia macellaria*) to fluctuating temperatures. **Travis Rusch** (trusch262@gmail.com), Jeffery K. Tomberlin and Aaron Tarone, Texas A&M Univ., College Station, TX

10:20 **1948** Simulation modeling: A tool for assessing laboratory-based development data sets in forensic entomology. **Jonathan A. Cammack** (jcammack_07@tamu.edu), Ashleigh Faris, Hsiao-Hsuan Wang and William Grant, Texas A&M Univ., College Station, TX

10:35 **1949** Review of blow fly (Diptera: Calliphoridae) laboratory development studies from the past 20 years across North America. **M. Denise Gemmellaro** (denise.gemmellaro@rutgers.edu)¹ and Lauren Weidner², ¹Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, ²Arizona State Univ., Glendale, AZ

10:50 Concluding remarks

Member Symposium: Applications of Molecular Ecology and Ecological Genomics to Agriculture and Pest Management

Room 276 (America's Center)

Moderators and Organizers: Tyler Raszick¹ and Alana Jacobson², ¹Texas A&M Univ., College Station, TX, ²Auburn Univ., Auburn, AL

9:00 Introductory remarks

9:05 **1950** Beyond candidate genes: Genomics of Colorado potato beetle adaptation to insecticides. **Michael S. Crossley** (mcrossley3@gmail.com)¹, Sean Schoville¹, Benjamin Pelissie¹, Yolanda Chen² and David J. Hawthorne³, ¹Univ. of Wisconsin, Madison, WI, ²Univ. of Vermont, Burlington, VT, ³Univ. of Maryland, College Park, MD

9:20 **1951** The sugarcane aphid microbiota and future implications for integrated pest management. **Jocelyn R. Holt** (holtjocelyn@tamu.edu)¹, Jennifer White², Samuel Nibouche³, Laurent Costet³, Antonino Malacrinò⁴ and Raul F. Medina¹, ¹Texas A&M Univ., College Station, TX, ²Univ. of Kentucky, Lexington, KY, ³INRA - CIRAD, Saint-Pierre, France, ⁴The Ohio State Univ., Columbus, OH

9:35 **1952** Transcript analysis of potato psyllid (*Bactericera cockerelli*) salivary glands. **Karol Krey** (karol.krey@gmail.com) and William Rodney Cooper, USDA - ARS, Wapato, WA

9:50 **1953** Development of RNAi technology for control of boll weevil and other *Anthonomus* species. **Loren Rivera Vega** (lorenrv@tamu.edu), Tyler Raszick, Ismael E. Badillo-Vargas, Keerti Rathore and Gregory Sword, Texas A&M Univ., College Station, TX

10:05 Break

10:20 **1954** Improving the diagnostic capacity for fruit flies belonging to the genus *Anastrepha* Schiner (Diptera: Tephritidae). **Raul Ruiz-Arce** (raul.a.ruiz@aphis.usda.gov)¹, Brian M. Wiegmann², Gary Steck³, Matthew Moore³, Marc Branham⁴, Erick Rodriguez⁴, Bruce Sutton⁵ and Allen Norrbom⁵, ¹USDA - APHIS, Edinburg, TX, ²North Carolina State Univ., Raleigh, NC, ³Florida Dept. of Agriculture and Consumer Services, Gainesville, FL, ⁴Univ. of Florida, Gainesville, FL, ⁵USDA - ARS, Washington, DC

10:35 **1955** Genomic insights into the migration and host strain hybridization patterns of a major agricultural pest, *Spodoptera frugiperda*. **Ashley Tessnow** (atessnow@tamu.edu), Tyler Raszick and Gregory Sword, Texas A&M Univ., College Station, TX

Oral Presentations

10:50 **1956** Targeted next generation sequencing to monitor for resistance to Bt corn in *Spodoptera frugiperda*. **Tejas Rao** (trao2@utk.edu), Matthew Huff, Caroline De Bortoli, Kurt Lamour, Margaret Staton and Juan-Luis Jurat-Fuentes, Univ. of Tennessee, Knoxville, TN

11:05 **1957** Genomic mechanisms influencing ecological divergence and adaptation in corn borer. **Brad Coates** (brad.coates@ars.usda.gov)¹, Genevieve Kozak², Yangzhou Wang³, Tom Sappington¹, Zhengying Wang⁴ and Erik Dopman⁵, ¹USDA - ARS, Ames, IA, ²Univ. of Massachusetts, North Dartmouth, MA, ³Jilin Academy of Agricultural Sciences, Changchun, China, ⁴Chinese Academy of Agricultural Sciences, Beijing, China, ⁵Tufts Univ., Medford, MA

11:35 Discussion

11:55 Concluding remarks

Member Symposium: Cuticular Hydrocarbons in Insect Communication and Physiology

Room 275 (America's Center)

Moderators and Organizers: Henry Chung¹ and Adrian A. Smith², ¹Michigan State Univ., East Lansing, MI, ²North Carolina Museum of Natural Sciences, Raleigh, NC

9:00 **1958** Insect hydrocarbon production: A fifty-year journey. **Gary J. Blomquist** (garyb@cabnr.unr.edu), Univ. of Nevada, Reno, NV

9:15 **1959** Evolutionary trade-offs shape functional cuticular hydrocarbon variation in the unicolonial Argentine ant (*Linepithema humile*). **Elizabeth Cash** (eicash@berkeley.edu)¹, Jan Buellesbach^{1,2}, Joshua Gibson^{1,3}, Rebecca Sandidge¹, Kelsey Scheckel¹, Brian Whyte¹ and Neil Tsutsui¹, ¹Univ. of California, Berkeley, CA, ²Univ. of Münster, Münster, Germany, ³Georgia Southern Univ., Statesboro, GA

9:30 **1960** Pleiotropic effects of ebony and tan on pigmentation and cuticular hydrocarbon composition in *Drosophila melanogaster*. **Jonathan Massey** (jhmassey@umich.edu)^{1,2}, Noriyoshi Akiyama³, Tanja Bien⁴, Klaus Dreisewerd⁴, Patricia Wittkopp¹, Joanne Yew⁵ and Aya Takahashi³, ¹Univ. of Michigan, Ann Arbor, MI, ²Janelia Research Campus of the Howard Hughes Medical Institute, Ashburn, VA, ³Tokyo Metropolitan Univ., Hachioji, Japan, ⁴Univ. of Münster, Münster, Germany, ⁵Univ. of Hawai'i, Honolulu, HI

9:45 **1961** Sexual isolation accompanies divergent cuticular chemistry among species in the *Drosophila americana* group. **Jeremy Davis** (jsd2@indiana.edu)¹, Joanne Yew² and Leonie Moyle¹, ¹Indiana Univ., Bloomington, IN, ²Univ. of Hawai'i, Honolulu, HI

10:00 **1962** Antennal grooming removes cuticular lipids and facilitates courtship performance in a group-living insect, the German cockroach. **Ayako Wada-Katsumata** (akatsum@ncsu.edu) and Coby Schal, North Carolina State Univ., Raleigh, NC

10:15 **1963** Habitat assessment by the American cockroach, *Periplaneta americana*, via volatile cues from chemical degradation of conspecific cuticular hydrocarbons. **Eduardo Hatano** (ehatano@ncsu.edu), Ayako Wada-Katsumata and Coby Schal, North Carolina State Univ., Raleigh, NC

10:30 Break

10:45 **1964** Genetic mechanisms underlying the functional coupling of the perception and production of insect pheromones. Kathleen Zelle¹, Cassondra Vernier¹, Nicole Leitner¹, Sean T. Halloran², Jocelyn Millar² and **Yehuda Ben-Shahar** (benshahary@wustl.edu)¹, ¹Washington Univ., St. Louis, MO, ²Univ. of California, Riverside, CA

11:00 **1965** The warrior queen? Aggression and signaling in queen-worker interactions in *Bombus impatiens*. **Margarita Orlova** (mfo5180@psu.edu), Erin Treanore and Etya Amsalem, Pennsylvania State Univ., University Park, PA

11:15 **1966** Ozonolysis of *Drosophila* cuticular hydrocarbons. **Benjamin Savage** (savagebe@msu.edu), Zinan Wang, Henry Chung and Matthew Grieshop, Michigan State Univ., East Lansing, MI

11:30 **SP1967** Methyl branched cuticular hydrocarbons and desiccation resistance. **Zinan Wang** (wangzina@msu.edu) and Henry Chung, Michigan State Univ., East Lansing, MI

11:40 **SP1968** Argentine ants (*Linepithema humile*) in the southeastern United States. **Joshua Gibson** (jgibson@georgiasouthern.edu)¹, Katherine Barrs¹, Paige Caine² and Charles Turner¹, ¹Georgia Southern Univ., Statesboro, GA, ²Bucknell Univ., Lewisburg, PA

11:50 **SP1969** Antennal olfactory sensilla responses to semiochemicals in red imported fire ants, *Solenopsis invicta*. **Yuzhe Du** (yuzhe.du@ars.usda.gov) and Jian Chen, USDA - ARS, Stoneville, MS

Member Symposium: Recent Advances in the Study of Neuropterida

Room 122 (America's Center)

Moderators and Organizers: David E. Bowles¹ and Atilano Contreras-Ramos², ¹US National Park Service, Republic, MO, ²Univ. Nacional Autónoma de México, Ciudad de México, DF, Mexico

9:00 Introductory remarks

9:05 **1970** Biodiversity of the Neuropterida: A global overview. **John Oswald** (j-owald@tamu.edu), Texas A&M Univ., College Station, TX

9:35 **1971** The tricondylic bar: A possible morphological synapomorphy of the Neuropterida (Insecta). **Samuel Howard** (howardsamuel@tamu.edu), Texas A&M Univ., College Station, TX

9:50 **1972** Progress in New World Chrysopid (Neuroptera: Chrysopidae) taxonomy. **Catherine Tauber** (cat6@cornell.edu), Cornell Univ., Davis, CA

10:05 Break and poster session

SD1973 The Megaloptera of Iowa. **David E. Bowles** (david_bowles@nps.gov)¹ and Gregory Courtney², ¹US National Park Service, Republic, MO, ²Iowa State Univ., Ames, IA

SD1974 Assessment of prey capacity of lacewing (*Mallada basalis* (Walker)) (Neuroptera: Chrysopidae) on three different pests. **Mei-Chun Lu** (lumj@mndaist.gov.tw), Han-Yan Ding, Nian-Jhen Li and Po-Yu Lai, Miaoli District Agricultural Research and Extension Station, Miaoli, Taiwan

10:20 **1975** Towards a taxonomic revision of Ascalaphinae (Myrmeleontidae) from Mexico. **Yesenia Marquez-López** (yeseniamarquez23@gmail.com)¹ and Atilano Contreras-Ramos², ¹Univ. Autónoma Metropolitana, Ciudad de México, DF, Mexico, ²Univ. Nacional Autónoma de México, Ciudad de México, DF, Mexico

Oral Presentations

10:35 **1976** Neuroptera from Tacaná volcano, Chiapas, Mexico. **Rodolfo Cancino-López** (cancinorodolfo@gmail.com), Univ. Nacional Autónoma de México, Ciudad de México, DF, Mexico

10:50 **1977** Knowledge on immature stages of Neotropical Megaloptera, with the second discovered larva of *Platyneuromus* (Corydalinae). **Atílano Contreras-Ramos** (acontreras@ib.unam.mx), Fernando Acevedo and Adrian Ardila-Camacho, Univ. Nacional Autónoma de México, Ciudad de México, DF, Mexico

11:05 Concluding remarks

Member Symposium: Systematics and Diversity of the Tenebrionoidea

Room 125 (America's Center)

Moderator and Organizer: Christopher Wirth, Purdue Univ., West Lafayette, IN

9:00 Introductory remarks

9:05 **1978** Sonoran Desert darkling beetles: Understanding southwestern biogeography from digitized collections data (Coleoptera: Tenebrionidae). **M. Andrew Johnston** (ajohnston@asu.edu), Arizona State Univ., Tempe, AZ

9:20 **1979** Morphological trends and issues in defining genera of Anthicidae. **Donald Chandler** (donald.chandler@unh.edu), Univ. of New Hampshire, Durham, NH

9:35 **1980** Biodiversity and phylogeny of Sepidini: Preliminary findings and next steps. **Marcin Kaminski** (mkaminski@miiw.waw.pl), Purdue Univ., West Lafayette, IN

9:50 **1981** Molecular insights into the phylogeny of Blapstinina (Coleoptera: Tenebrionidae: Opatriini). **Ryan Lumen** (ryan_lumen@nau.edu)¹ and Marcin Kaminski², ¹Northern Arizona Univ., Flagstaff, AZ, ²Purdue Univ., West Lafayette, IN

10:05 **1982** Tenebrionidae diversity of Belize, an update. **M. Fran Keller** (mfkeller@ucdavis.edu), Bohart Museum of Entomology, Davis, CA

10:20 Break

10:35 **1983** A preliminary phylogeny of the neotropical Anopidiina. **Erich Spiessberger** (anopidiina@gmail.com), Vinicius Ferreira and Michael Ivie, Montana State Univ., Bozeman, MT

10:50 **1984** New generic concepts in Edrotini (Coleoptera: Tenebrionidae: Pimeliinae): Synthesizing targeted enrichment and morphological data. **Christopher Wirth** (christophercwirth@gmail.com) and Aaron Smith, Purdue Univ., West Lafayette, IN

11:05 **1985** *Boros unicolor* Say (Coleoptera: Boridae): Descriptions of the larva, pupa, and life history of the North American "conifer bark beetle". **Warren E. Steiner** (steinerw@si.edu), Smithsonian Institution, Washington, DC

11:20 **1986** Preliminary phylogeny of the desert darkling beetles (Coleoptera: Tenebrionidae: Pimeliinae) using targeted enrichment, and the evolution of background matching through pruinescence. **Aaron Smith** (pimeliinae@gmail.com)¹, Kojun Kanda², Christopher Wirth¹, Marcin Kaminski¹, Jonah Ulmer³, Katja Seltmann⁴ and István Mikó⁵, ¹Purdue Univ., West Lafayette, IN, ²Northern Arizona Univ., Flagstaff, AZ, ³Pennsylvania State Univ., University Park, PA, ⁴Univ. of California, Santa Barbara, CA, ⁵Univ. of New Hampshire, Durham, NH

11:50 Concluding remarks

10-min: MUVE, Bed Bugs and Cockroaches

Room 130 (America's Center)

Moderators: Junaid Rehman¹ and Mary Rushton², ¹Univ. of Mississippi, Univ., MS, ²Corteva Agriscience, Indianapolis, IN

9:00 **1987** How bed bug metabolism and environmental conditions significantly effect laboratory outcomes using Phantom, a pro-insecticide. **Jason Meyers** (jason.meyers@basf.com)¹, Ameya Gondhalekar², Sudip Gaire² and Aaron Ashbrook², ¹BASF Corporation, Kansas City, MO, ²Purdue Univ., West Lafayette, IN

9:10 **1988** Toxicity profiling of fourteen commercially sourced essential oils against the common bed bug *Cimex lectularius* L. (Cimicidae: Hemiptera). **Junaid Rehman** (junaiddua@gmail.com), Amar Chittiboyina and Ikhlas Khan, Univ. of Mississippi, Univ., MS

9:20 **1989** Spinosad and fluralaner are effective at incapacitating *Cimex lectularius* L., the common bed bug. **Johnathan Sheele** (jsheele@gmail.com), Mayo Clinic, Jacksonville, FL

9:30 **1990** Ontogenesis of aldehyde pheromones in bed bugs (Heteroptera: Cimicidae). **Mark Dery** (mdery001@ucr.edu), Kyle Arriola and Dong-Hwan Choe, Univ. of California, Riverside, CA

9:20 **1991** Presentation withdrawn

9:50 **1992** From ancient Greece to modern cities: How the bed bug has influenced human societies. **Marcia Anderson** (anderson.marcia@epa.gov), US Environmental Protection Agency, Arlington, VA

10:00 **1993** Mating and starvation modulate host-seeking and feeding propensity in bed bug females, *Cimex lectularius*. **Ahmed Saveer** (msahmed3@ncsu.edu), Zachary DeVries and Coby Schal, North Carolina State Univ., Raleigh, NC

10:10 **1994** Presentation withdrawn

10:20 **1995** Novel attractants for trapping German cockroaches. **Salehe Abbar** (abbar@sebs.rutgers.edu) and Changlu Wang, Rutgers, The State Univ. of New Jersey, New Brunswick, NJ

10:30 **1996** Effects of natural and artificial sweeteners on the survival and reproduction of the German cockroach, *Blattella germanica* (Blattodea: Ectobiidae). Li-Yan Gan¹, Intan Ishak¹ and **Chow-Yang Lee** (chowyang@mac.com)^{1,2}, ¹Universiti Sains Malaysia, Penang, Malaysia, ²Univ. of California, Riverside, CA

10:40 **1997** Laboratory and field performance of ActiveSense insect remote monitoring system. **Mary Rushton** (mary.rushton@corteva.com)¹, Joe DeMark², Brad Hopkins¹ and Neil Spomer¹, ¹Corteva Agriscience, Indianapolis, IN, ²Corteva Agriscience, Fayetteville, AR

10-min: MUVE, Outreach, Urban Insects Control, and Insects as Food

Room 131 (America's Center)

Moderators: Mei-Chun Lu¹ and Moritz Gold², ¹Miaoli District Agricultural Research and Extension Station, Miaoli, Taiwan, ²Swiss Federal Institute of Aquatic Science and Technology, Dübendorf, Switzerland

9:00 **1998** Grasshopper protein powder as alternative protein supplement for internally displaced persons in northeastern Nigeria. **Silas Ishaya** (emperolspliz@gmail.com), Comfort Human Right Foundation, Jalingo, Nigeria

Oral Presentations

9:10 **1999** Influence of blend ratio composite flour of *Gonimbrasia belina* (Lepidoptera: Saturniidae) larvae-maize on mineral composition. Matome Moleha¹ and **Maboko Mphosi** (maboko.mphosi@ul.ac.za)^{1,2}, ¹Univ. of Limpopo, Sovenga, South Africa, ²Univ. of Limpopo, Polokwane, South Africa

9:20 **2000** Fact or fiction: The real data behind the ecological impacts of insect agriculture. **Trina Chiasson** (trina@ovipost.com), Ovipost, LaBelle, FL

9:30 **2001** An effective approach to controlling small flies and cockroaches in commercial kitchens. **Reid Ipsen** (reidi@nisuscorp.com), Nisus Corporation, Rockford, TN

9:40 **2002** Broadening our audience by diversifying the messenger, part 2. **Faith Oi** (foi@ufl.edu)¹, Katherine Allen², Judy Corbus³, John Diaz⁴, Lisa Hamilton⁵ and Kaydie McCormick⁶, ¹Univ. of Florida, Gainesville, FL, ²Univ. of Florida, Live Oak, FL, ³Univ. of Florida, Chipley, FL, ⁴Univ. of Florida, Plant City, FL, ⁵Univ. of Florida, Volusia, FL, ⁶Univ. of Florida, Sanford, FL

9:50 **2003** Importance of taxonomy and population genetics in black soldier fly production. **Chong Chin Heo**
(chongchin83@tamu.edu)¹, Martin Hauser² and Jeffery K. Tomberlin³,
¹Universiti Teknologi Mara, Sungai Buloh, Malaysia, ²California Dept. of Food and Agriculture, Sacramento, CA, ³Texas A&M Univ., College Station, TX

10:00 **2004** Bacterial communities of mosquito-associated Phytotelmata in northern Taiwan. **Matan Shelomi** (mshelomi@ntu.edu.tw), National Taiwan Univ., Taipei, Taiwan

10:10 **2005** Antibiotic and antixenotic properties of substrates inhabited by black soldier fly larvae. **Andrei Alyokhin** (alyokhin@maine.edu), Joshua Villazana and Edward Bernard, Univ. of Maine, Orono, ME

10:20 **2006** Residence time and *in vitro* digestion model of the black soldier fly (*Hermetia illucens*) larva midgut. **Moritz Gold** (moritz.gold@hest.ethz.ch)^{1,2}, Julia Egger¹, Christian Zurbrügg², Daniele Bruno³, Marco Bonelli⁴, Gianluca Tettamanti³, Morena Casartelli⁴, Eric Schmitt⁵, Alexander Mathys¹ and Andreas Scheidegger², ¹ETH Zurich, Zurich, Switzerland, ²Swiss Federal Institute of Aquatic Science and Technology, Dübendorf, Switzerland, ³Univ. of Insubria, Varese, Italy, ⁴Univ. of Milan, Milano, Italy, ⁵Protix, Dongen, Netherlands

10-min: MUVE, Vector Control

Room 123 (America's Center)

Moderators: Heather Hernandez¹ and Jennifer Breaux², ¹Univ. of Texas, Edinburg, TX, ²New Orleans Mosquito, Termite and Rodent Control Board, New Orleans, LA

9:00 2007 Evolution in a vector control program to adapt to new challenges and to take advantage of emerging technologies.
Gregory White (greg@slcmad.org) and Ary Faraji, Salt Lake City Mosquito Abatement District, Salt Lake City, UT

9:10 **2008** Vitamin C as a low-cost, low-toxicity alternative to synthetic insecticides in attractive toxic sugar baits.
Emily McDermott (emily.g.mcdermott.civ@mail.mil)¹, Katherine Tucker¹, Erin Morris¹ and Lindsey Garver^{1,2}, ¹Walter Reed Army Institute of Research, Silver Spring, MD, ²US Army Medical Materiel Development Activity, Fort Detrick, MD

9:20 **2009** How sweet it is: Artificial sweeteners as ATSB toxicants for *Aedes aegypti* and *Anopheles darlingi* in SOUTHCOM. Michael Fisher¹, Gissella Vasquez², **Victor Lopez** (victorlopezsifuentes@gmail.com)¹ and Karin Escobedo¹, ¹US Naval Medical Research Unit 6, Lima, Peru, ²US Naval Medical Research Unit 6, Callao, Peru

9:30 2010 Multi-year comparison of insecticide resistance in *Aedes aegypti* and *Ae. albopictus* mosquitoes. **Heather Hernandez** (heather.hernandez01@utrgv.edu)¹, Christopher Vitek² and Whitney Qualls³, ¹Univ. of Texas, Edinburg, TX, ²Univ. of Texas Rio Grande Valley, Edinburg, TX, ³Texas Dept. of State Health Services, Austin, TX

9:40 **2011** Accelerating malaria elimination efforts in the Sudano-Sahelian region of Africa: Elucidation of factors driving transmission and unravelling the molecular basis of insecticide resistance in the major malaria vectors. **Sulaiman Ibrahim**
(sulaimansadi.ibrahim@lstm.ac.uk)^{1,2}, Muhammad Mukhtar², Amen Fadel³, Gareth Weedall⁴, Jack Hearn¹, Helen Irving¹ and Charles Wondji¹, ¹Liverpool School of Tropical Medicine, Liverpool, United Kingdom, ²Bayero Univ., Kano, Nigeria, ³Centre for Research in Infectious Diseases, Yaounde, Cameroon, ⁴Liverpool John Moores Univ., Liverpool, United Kingdom

9:50 2012 Does smoke equal fire? Investigating natural *Wolbachia* infections in an *Aedes aegypti* population from Florida.
Jovana Bozic (jovanabozic@ufl.edu)¹, Carla Mavian², Seokyung Kang², Maria Ukhanova², Eva Buckner¹, Juliana Carrillo², Sean Boyles², Tanise Stern¹, Xiaodi Wang¹, Marco Salemi², Volker Mai², Mattia Prosperi², Rhoei Dinglasan^{2,3} and Derrick Mathias¹, ¹Univ. of Florida, Vero Beach, FL, ²Univ. of Florida, Gainesville, FL, ³Centers for Disease Control and Prevention, Gainesville, FL

10:00 **2013** Presentation withdrawn

10:10 Break

10:20 **2014** Characterization of female germline and early zygote promoter from the transcription factor Bzjip1 in the mosquito *Aedes aegypti*. **Bianca Kojin** (biburni@tamu.edu), Texas A&M Univ., College Station, TX

10:30 **2015** Soil treatment of *Metarhizium brunneum* F52 granule containing microsclerotia: Effective in reducing egg hatch of *Aedes aegypti*. **Lina Flor-Weiler** (lina.weiler@ars.usda.gov)¹, Robert Behle¹, Eric Johnson¹, Alejandro Rooney¹ and Daniel Strickman²,
¹USDA - ARS, Peoria, IL, ²Bill and Melinda Gates Foundation, Seattle, WA

10:40 **2016** Evaluation of biological control agents for suppression of larval mosquito populations in man-made containers in New Orleans. **Jennifer Breaux** (jabreaux@nola.gov)¹, Daniel Simões² and Claudia Riegel³, ¹New Orleans Mosquito, Termite and Rodent Control Board, New Orleans, LA, ²Univ. Comunitária da Região de Chapecó, Chapecó, Brazil, ³City of New Orleans Mosquito, Termite & Rodent Control Board, New Orleans, LA

10:50 **2017** Spray Safe, Play Safe: Story-based short films to help families understand backyard acaricide use for preventing Lyme disease. **Victoria Hornbostel** (hornbostelv@wcsu.edu)¹, Rayda K. Krell¹, Jennifer Reid², Scotto Volpe¹ and Neeta P. Connally¹, ¹Western Connecticut State Univ., Danbury, CT, ²BLAST Tickborne Disease Prevention Program, Ridgefield, CT

11:00 **2018** Mowing practices and different substrates for control of the blacklegged tick, *Ixodes scapularis* (Acari:Ixodidae) on trails. **Xia Lee** (xlee1@wisc.edu)¹, Kristofer Keller² and Dan MacSwain³. ¹Univ. of Wisconsin, Madison, WI, ²Washington County Public Health and Environment, Stillwater, MN, ³Washington County Public Works Dept., Stillwater, MN

11:10 **2019** Acaricidal resistance status of *Rhipicephalus microplus* (Acar: Ixodidae) from Punjab, Pakistan. **Muhammad Oneeb** (muhammad.oneeb@uvas.edu.pk)¹, Amna Chudhary¹, Huma Naeem¹, Muhammad Nazir² and Kamran Ashraf¹. ¹Univ. of Veterinary and Animal Sciences, Lahore, Pakistan, ²Bahauddin Zakariya Univ., Multan, Pakistan.

Oral Presentations

11:20 2020 Evaluation of tick abundance and tick-borne disease risk on school property in suburban Maryland and efficacy of integrated tick control. **Erika Machtinger** (etm10@psu.edu)¹, Robyn Nadolny², Andrew Li³ and Matthew Milholland⁴, ¹Pennsylvania State Univ., University Park, PA, ²US Army, Aberdeen Proving Ground Edgewood, MD, ³USDA - ARS, Beltsville, MD, ⁴Univ. of Maryland, Beltsville, MD

10-min: PBT, Microbe Interactions and Chemical Ecology

Room 274 (America's Center)

Moderators: Michael Grodowitz¹ and Amelia Lindsey², ¹USDA - ARS, Stoneville, MS, ²Indiana Univ., Bloomington, IN

9:00 2021 Dynamics of invasive insect gut microbiome when facing environmental stress. **Judith Mogouong** (judith.mogouong@iaf.inrs.ca), Claude Guertin and Philippe Constant, Univ. du Québec, Laval, QC, Canada

9:10 2022 Bacteriocyte inheritance for symbiont transmission in whiteflies. **Jun-Bo Luan** (jbluan@syau.edu.cn), Shenyang Agricultural Univ., Shenyang, China

9:20 2023 *Wolbachia* infection alters nucleotide metabolism in fly hosts. **Amelia Lindsey** (amlind@iu.edu), Jason Tennesen and Irene Newton, Indiana Univ., Bloomington, IN

9:30 2024 Gross morphology of diseased tissues in *Nezara viridula* (L.) (Hemiptera: Pentatomidae) and molecular characterization of associated microorganisms. **Michael Grodowitz** (michael.grodowitz@ars.usda.gov)¹, Brad Elliott¹, Adam Rivers², Margaret Allen¹, Mark Weaver¹, M. Guadalupe Rojas¹ and Juan Morales-Ramos¹, ¹USDA - ARS, Stoneville, MS, ²USDA - ARS, Gainesville, FL

9:40 2025 Gut microbiome determinants of wild *Drosophila melanogaster* nutrition. **David Kang** (dsk249@cornell.edu) and Angela E. Douglas, Cornell Univ., Ithaca, NY

9:50 2026 Dissecting the impacts of symbiotic associations in *Reticulitermes flavipes*. **Brittany Peterson** (bripete@sie.edu), Southern Illinois Univ., Edwardsville, IL

10:00 2027 Presentation withdrawn

10:10 2028 Olfactory responses of gravid female African armyworm, *Spodoptera exempta* Walker (Lepidoptera: Nuctuidae) to host plant volatiles. **Emmanuel Ogah** (emmamarg2005@yahoo.com) and Toby Bruce, Rothamsted Research, Harpenden, United Kingdom

10:20 2029 Changing volatile profiles may facilitate mate location and choice in the butterfly *Parnassius smintheus*. **Justine Samuel** (samuelje@mail.uc.edu), Univ. of Cincinnati, Cincinnati, OH

10:30 2030 Pathogenicity of indigenous nuclear polyhedrosis virus isolate for management of *Spodoptera litura*. **Muhammad Bilal Ayyub** (mbilalayyub@gmail.com), Ahmad Nawaz, Shah Zaman, Tauqir Anwar, Khawar Saleem, Muhammad Iqbal and Muhammad Dildar Gogi, Univ. of Agriculture, Faisalabad, Pakistan

10-min: P-IE, IPM, Field Crops 1

Room 264 (America's Center)

Moderators: G. David Buntin¹ and Jason Schmidt², ¹Univ. of Georgia, Griffin, GA, ²Michigan State Univ., East Lansing, MI

9:00 2031 Silage sorghum yield and quality after sugarcane aphid damage. **G. David Buntin** (gbuntin@uga.edu)¹, Sriyanka Lahiri², Michael Toews³ and Xinzhi Ni⁴, ¹Univ. of Georgia, Griffin, GA, ²Univ. of Florida, Wimauma, FL, ³Univ. of Georgia, Tifton, GA, ⁴USDA - ARS, Tifton, GA

9:10 2032 Remnant sorghum and Johnson grass as sources for parasitoids and predators of the sugarcane aphid on grain sorghum. **Ashleigh Faris** (ashleigh.faris@ag.tamu.edu), David Olsovsky and Michael Brewer, Texas A&M AgriLife Research, Corpus Christi, TX

9:20 2033 When the rubber meets the road: Incorporating natural enemies into sugarcane aphid thresholds. **Micky Ebanks** (m-ebanks@tamu.edu)¹ and Adrianna Szczepaniec², ¹Texas A&M Univ., College Station, TX, ²Texas A&M AgriLife Research, Amarillo, TX

9:30 2034 Soybean gall midge: Observations on an emerging pest of soybean. **Anthony McMechan** (justin.mcmechan@unl.edu)¹, Adam Varenhorst², Erin Hodgson³, Thomas Hunt⁴, Robert Wright⁵, Débora Montezano⁶ and Bruce Potter⁶, ¹Univ. of Nebraska, Ithaca, NE, ²South Dakota State Univ., Brookings, SD, ³Iowa State Univ., Ames, IA, ⁴Univ. of Nebraska, Concord, NE, ⁵Univ. of Nebraska, Lincoln, NE, ⁶Univ. of Minnesota, Lamberton, MN

9:40 2035 Evaluating the impact of planting date on soybean gall midge infestation and injury to soybean. **Débora Montezano** (deagm@gmail.com)¹, Anthony McMechan², Thomas Hunt³ and Robert Wright¹, ¹Univ. of Nebraska, Lincoln, NE, ²Univ. of Nebraska, Ithaca, NE, ³Univ. of Nebraska, Concord, NE

9:50 2036 Indirect effects of deer on insect pest populations in soy fields. **Abigail VanGorder**¹, Michael Mahon¹, **Hannah Penn** (hannahjpenn@gmail.com)² and Thomas O. Crist¹, ¹Miami Univ., Oxford, OH, ²Univ. of Texas, Edinburg, TX

10:00 2037 Management costs and losses to soybean insects in the southern U.S., 2011-2018. **Fred Musser** (fm61@msstate.edu)¹, Angus Catchot¹, Gus Lorenz², Jeffrey Davis³, Scott Stewart⁴, Dominic Reisig⁵, Sally Taylor⁶ and Tim Reed⁷, ¹Mississippi State Univ., Mississippi State, MS, ²Univ. of Arkansas, Lonoke, AR, ³Louisiana State Univ., Baton Rouge, LA, ⁴Univ. of Tennessee, Jackson, TN, ⁵North Carolina State Univ., Plymouth, NC, ⁶Virginia Polytechnic Institute and State Univ., Suffolk, VA, ⁷Auburn Univ., Madison, AL

10:10 2038 Efficacy of Blackhawk® and Radiant® for management of corn earworm, *Helicoverpa zea*, in seed corn production. **Jeffrey Krumm** (jeffrey.t.krumm@corteva.com)¹, Paul Marquardt², Kevin Hahn³, Laura Campbell⁴ and Patricia Prasifka⁵, ¹Corteva Agriscience, Hastings, NE, ²Corteva Agriscience, Des Moines, IA, ³Corteva Agriscience, Bloomington, IL, ⁴Corteva Agriscience, Carbondale, IL, ⁵Corteva Agriscience, West Fargo, ND

10:20 2039 Bt corn and corn earworm in the mid-southern U.S. **Don Cook** (dcook@drec.msstate.edu)¹, Scott Stewart², Angus Catchot³, Gus Lorenz⁴, David Kerns⁵, Glenn Studebaker⁶, Sebe Brown⁷, Nick Seiter⁸, Julien Beuzelin⁹, Larry Falconer¹⁰, Nick Bateman¹¹ and Ben Thrash⁴, ¹Mississippi State Univ., Stoneville, MS, ²Univ. of Tennessee, Jackson, TN, ³Mississippi State Univ., Mississippi State, MS, ⁴Univ. of Arkansas, Lonoke, AR, ⁵Texas A&M AgriLife Extension Service, College Station, TX, ⁶Univ. of Arkansas, Keiser, AR, ⁷Louisiana State Univ., Winnsboro, LA, ⁸Univ. of Illinois, Champaign, IL, ⁹Univ. of Florida, Belle Glade, FL, ¹⁰Michigan State Univ., Stoneville, MS, ¹¹Univ. of Arkansas, Stuttgart, AR

10:30 Break

10:40 2040 Presentation withdrawn

10:50 2041 Re-evaluating spider mite management within water-efficient crop technologies. **Ricardo Ramirez** (ricardo.ramirez@usu.edu), Julian Golec, Matt Yost, Earl Creech and Niel Allen, Utah State Univ., Logan, UT

11:00 2042 Cotton IPM in Alabama. **Aaron Cato** (acato@uaex.edu)¹ and Ron Smith², ¹Univ. of Arkansas, Little Rock, AR, ²Univ. of Auburn, Auburn, AL

Oral Presentations

9:10 **2067** Landscape-level drivers of Bt resistance for *Helicoverpa zea* (Lepidoptera: Noctuidae) in corn-cotton agroecosystems. **Kristen Hopperstad** (kahopper@ncsu.edu)¹, Benjamin Arends¹, Dominic Reisig², George Kennedy¹, Guy Collins³, Francis Reay-Jones⁴, Jeremy Greene⁵ and Anders Huseth¹, ¹North Carolina State Univ., Raleigh, NC, ²North Carolina State Univ., Plymouth, NC, ³North Carolina State Univ., Rocky Mount, NC, ⁴Clemson Univ., Florence, SC, ⁵Clemson Univ., Blackville, SC

9:20 **2068** Resistance in lepidopteran pests to *Bacillus thuringiensis* (Bt) plant incorporated protectants (PIPs) in the United States: EPA's proposed improvements to current IRM strategies. **Kara Welch** (welch.kara@epa.gov), Alan Reynolds and Amanda Pierce, US Environmental Protection Agency, Washington, DC

9:30 **2069** F_2 screen for resistance among field collected *Spodoptera frugiperda* (Lepidoptera: Noctuidae) to Cry1A.105+Cry2Ab2 maize sampled in the northeastern parts of South Africa. **Andries Botha** (nwuluan@gmail.com)¹, Annemie Erasmus², Hannalene Du Plessis¹ and Johnnie Van den Berg¹, ¹North-West Univ., Potchefstroom, South Africa, ²Agricultural Research Council, Potchefstroom, South Africa

9:40 **2070** Identification and frequency of an allele linked to resistance against Cry1Fa corn in *Spodoptera frugiperda* from Florida. **Caroline De Bortoli** (cplacidi@utk.edu)¹, Rahul Banerjee¹, Fangneng Huang², James Hasler³, Francis Reay-Jones⁴, Robert L. Meagher⁵, Scott Stewart⁶, Diego Viteri⁷, Xinzhi Ni⁸, Angela Linarez⁹, G. David Buntin¹⁰, Ken Narva⁹ and Juan-Luis Jurat-Fuentes¹, ¹Univ. of Tennessee, Knoxville, TN, ²Louisiana State Univ., Baton Rouge, LA, ³Corteva Agriscience, Indianapolis, IN, ⁴Clemson Univ., Florence, SC, ⁵USDA - ARS, Gainesville, FL, ⁶Univ. of Tennessee, Jackson, TN, ⁷Univ. of Puerto Rico, Isabela, PR, ⁸USDA - ARS, Tifton, GA, ⁹Univ. of Puerto Rico, Lajas, PR, ¹⁰Univ. of Georgia, Griffin, GA

9:50 **2071** Effects of Bt toxins on flight activity of *Spodoptera frugiperda* (Lepidoptera: Noctuidae). **Rafael Santos** (rsdosantos.rs@gmail.com), Giordano Assirati, Caroline De Bortoli, Lucas Hietala and Juan-Luis Jurat-Fuentes, Univ. of Tennessee, Knoxville, TN

10:00 **2072** Susceptibility of different instars of *Striacosta albicosta* (Lepidoptera: Noctuidae) to Vip3A, a *Bacillus thuringiensis* protein. **Yasmine Farhan** (yfarhan@uoguelph.ca), Jocelyn Smith and Arthur Schaafsma, Univ. of Guelph, Ridgetown, ON, Canada

10:10 **2073** Geometric analysis of nutrient regulation in the western bean cutworm (*Striacosta albicosta*). **Katharine Swoboda Bhattacharai** (kswoboda3@unl.edu)¹, Carrie Deans², Spence Behmer³ and Julie Peterson¹, ¹Univ. of Nebraska, North Platte, NE, ²Univ. of Minnesota, Minneapolis, MN, ³Texas A&M Univ., College Station, TX

10:20 **2074** Cry1F resistance in European corn borer *Ostrinia nubilalis* (Lepidoptera: Crambidae) discovered in Nova Scotia, Canada. **Jocelyn Smith** (jocelyn.smith@uoguelph.ca), Yasmine Farhan and Arthur Schaafsma, Univ. of Guelph, Ridgetown, ON, Canada

10:30 **2075** Presentation withdrawn

10:40 Break

10:50 **2076** Inheritance and fitness costs of field-evolved resistance to Cry3Bb1 corn by western corn rootworm. **Ram B. Shrestha** (shrestrb@iastate.edu) and Aaron J. Gassmann, Iowa State Univ., Ames, IA

11:00 **2077** Characterization of western corn rootworm resistance against Cry34Ab1/Cry35Ab1 in northeast Iowa. **Amit Sethi** (bugologist@gmail.com), Benchie Ortegon, Erick Hernandez, Ashley Miles, Jian-Zhou (Joe) Zhao and Andre Crespo, Corteva Agriscience, Johnston, IA

11:10 **2078** An assessment on IRM frameworks for novel non-Bt insect-resistant traits. **Desmi Chandrasena** (desmi.chandrasena@corteva.com)¹, Chad Boeckman¹, Nicholas Storer², Amit Sethi¹, Ian Lamb¹ and Jamie Staley¹, ¹Corteva Agriscience, Johnston, IA, ²Corteva Agriscience, Indianapolis, IN

11:20 **2079** Exploration of genome variation among *Aphis glycines* (Hemiptera: Aphididae) biotypes. Brad Coates¹, **Jessica Hohenstein** (jdhohen@iastate.edu)², Ravi Kiran Donthu^{3,4}, Rosanna Giordano^{3,4}, Andrew Michel⁵, Erin Hodgson² and Matthew O'Neal², ¹USDA - ARS, Ames, IA, ²Iowa State Univ., Ames, IA, ³KYB, Inc, San Juan, PR, ⁴Puerto Rico Science, Technology & Research Trust, San Juan, PR, ⁵The Ohio State Univ., Wooster, OH

11:30 **2080** Egg cannibalism by insecticide-resistant *Leptinotarsa decemlineata* hatchlings compensates for resistance costs and partial resistance. **Mitchell Baker** (mitchell.baker@qc.cuny.edu)¹, Andleeb Tanvir¹, Karyn Collie^{1,2}, Natalie Solari¹ and Israel Weiss¹, ¹Queens College, City Univ. of New York, Flushing, NY, ²Malone Univ., Canton, OH

11:40 **2081** A critical dose bioassay to assess insecticide tolerance among populations of *Bemisia tabaci* in Florida vegetable fields. **Hugh A. Smith** (hugasmith@ufl.edu)¹, Bruno Rossitto De Marchi¹, David Riley² and Alton Sparks², ¹Univ. of Florida, Wimauma, FL, ²Univ. of Georgia, Tifton, GA

11:50 **2082** Surveying bacterial endosymbiont diversity among *Bemisia tabaci* (Hemiptera: Aleyrodidae) populations in Florida. **Bruno Rossitto De Marchi** (bruno.rossittode@ufl.edu) and Hugh A. Smith, Univ. of Florida, Wimauma, FL

12:00 **2083** Lepidopteran pests in the Florida Panhandle and their susceptibility to pyrethroid and diamide insecticides. **Marcelo Rabelo** (mmendesrabelo@ufl.edu)¹, Silvana Paula-Moraes¹, Blair Siegfried² and Eliseu Pereira³, ¹Univ. of Florida, Jay, FL, ²Univ. of Florida, Gainesville, FL, ³Univ. Federal de Viçosa, Viçosa, Brazil

12:10 **2084** Diamide resistance in the American serpentine leafminer, *Liriomyza trifolii* (Diptera: Agromyzidae): Monitoring, mechanism of resistance and management. **Scott Ferguson** (scott@atoconsult.com)¹, Jan Elias², Christoph Zimmer³ and Eve Daum³, ¹Atlantic Turf & Ornamental Consulting, Vero Beach, FL, ²Syngenta Crop Protection, Stein, Switzerland, ³Syngenta AG, Stein, Switzerland

10-min: P-IE, Vectors of Plant Disease

Room 265 (America's Center)

Moderators: Jeffrey Davis¹ and Emily Tronson², ¹Louisiana State Univ., Baton Rouge, LA, ²Purdue Univ., West Lafayette, IN

9:00 **2085** Impact of crop variety, infection status, and vector species on PVY transmission efficiency in potato. **Jeff Davis** (jeffdavis@agcenter.lsu.edu)¹, Edward B. Radcliffe² and Ian MacRae³, ¹Louisiana State Univ., Baton Rouge, LA, ²Univ. of Minnesota, St. Paul, MN, ³Univ. of Minnesota, Crookston, MN

9:10 **2086** Comparative probing activity of two psyllid species on host and non-host plants (Hemiptera: Psylloidea: Triozidae: *Bactericerina*). **Tariq Mustafa** (tariq.mustafa@uaf.edu.pk)¹, David R. Horton², William Rodney Cooper², Richard Zack³ and Joseph Munyanza², ¹Univ. of Agriculture, Faisalabad, Pakistan, ²USDA - ARS, Wapato, WA, ³Washington State Univ., Pullman, WA

9:20 **2087** Resistance is not futile: Diversity and distribution of leafhoppers (Hemiptera: Cicadellidae) in Mississippi muscadines. **Chris Werle** (chris.werle@ars.usda.gov)¹, Olga Mavrodil², Eric Stafne², Ebraheim Babiker¹ and John Adamczyk¹, ¹USDA - ARS, Poplarville, MS, ²Mississippi State Univ., Poplarville, MS

Oral Presentations

Wednesday, November 20

9:30 **2088** Incidence of phytoplasmas in diverse cropping systems in the Columbia Basin. **Tiziana Oppedisano** (oppedist@oregonstate.edu), James Crosslin and Silvia Rondon, Oregon State Univ., Hermiston, OR

9:40 **2089** Seasonal occurrence of Sri Lankan cassava mosaic virus and its vector *Bemisia tabaci* on cassava in southern Vietnam. **Keiji Takasu** (takasu.keiji.155@m.kyushu-u.ac.jp) and Van Chien Tran, Kyushu Univ., Fukuoka, Japan

9:50 **2090** Whole leaf metabolites influence the probing behavior of *Diaphorina citri* on four Cleopatra Mandarin hybrid selections (*Citrus reticulata* x *C. ichangensis*) and Pummelo, *C. maxima*. **Holly Shugart** (hshugart@ufl.edu), Nabil Killiny, Timothy Ebert and Michael Rogers, Univ. of Florida, Lake Alfred, FL

10:00 **2091** Role of onion thrips in the development of *Stemphylium* leaf blight in onion. **Ashley Leach** (al2282@cornell.edu)¹, Frank Hay², Riley Harding¹ and Brian Nault¹, ¹Cornell Univ., Geneva, NY, ²Cornell AgriTech, Geneva, NY

10:10 **2092** Hyperspectral reflectance can pre-symptomatically detect cucumber beetle vectored bacterial wilt (*Erwinia tracheiphila*) infection. **Emily Tronson** (emilyjtronson@gmail.com), Laura Ingwell, John Couture and Ian Kaplan, Purdue Univ., West Lafayette, IN

10:20 **2093** Presentation withdrawn

10-min: SysEB, Evolution, Behavior, Ecology, and Genetics

Room 126 (America's Center)

Moderators: Andrew Sweet¹ and Paul Frandsen², ¹Purdue Univ., West Lafayette, IN, ²Brigham Young Univ., Provo, UT

9:00 **2094** Broken records: A repeated evolutionary history of mitochondrial genome fragmentation in parasitic lice. **Andrew Sweet** (sweet19@purdue.edu) and Stephen Cameron, Purdue Univ., West Lafayette, IN

9:10 **2095** Presentation withdrawn

9:20 **2096** Assisting pollinator conservation with machine learning and open data. **Anahi Espindola** (anahiesp@umd.edu), Univ. of Maryland, College Park, MD

9:30 **2097** Metabarcoding litter arthropods to assess endemicity in the high Appalachians. **Michael Caterino** (mcateri@clemson.edu), Clemson Univ., Clemson, SC

9:40 **2098** Target enrichment using PCR-based probes: Applications of a flexible and low-cost sequencing method. **Bruno de Medeiros** (souzademedeiros@fas.harvard.edu)¹, Sang Il Kim¹, Fabio Silva², Zhengyang Wang¹ and Brian D. Farrell¹, ¹Harvard Univ., Cambridge, MA, ²Univ. de São Paulo, São Paulo, Brazil

9:50 **2099** An exploration of the genetic basis of caddisfly silk, the mortar of underwater architecture. **Paul Frandsen** (paul_frandsen@byu.edu)¹ and Russell Stewart², ¹Brigham Young Univ., Provo, UT, ²Univ. of Utah, Salt Lake City, UT

10:00 **2100** Leveraging signal from repetitive DNA to improve studies of species delimitation and genome evolution in diverse non-model groups. **John Sproul** (johnssproul@gmail.com), Univ. of Rochester, Rochester, NY

10:10 **2101** How predictable is the genomics of diapause life history adaptation in allochronically isolating host races and species of *Rhagoletis* flies? **Jeffrey Feder** (jfeder@nd.edu)¹, Peter Meyers¹, Meredith Doellman¹, Glen Hood² and Gregory Ragland³, ¹Univ. of Notre Dame, South Bend, IN, ²Wayne State Univ., Houston, MI, ³Univ. of Colorado, Denver, CO

10:20 **2102** Hemomucin as a key determinant of host-parasitoid interactions. **Kevin Ferro** (kferro@email.arizona.edu) and Todd Schlenke, Univ. of Arizona, Tucson, AZ

10:30 **2103** The mechanistic basis of a *Drosophila* defense behavior against parasitoid wasps. Shaun Davis¹, Michael Martin² and **Todd Schlenke** (schlenke@email.arizona.edu)¹, ¹Univ. of Arizona, Tucson, AZ, ²Oxford College, Oxford, GA

10:40 **2104** Adaptive radiation in the "bristle flies" (Diptera: Tachinidae). **John Stireman** (john.stireman@wright.edu), Wright State Univ., Dayton, OH

10:50 **2105** Mitochondrial genome evolution in thrips (Thysanoptera). **Stephen Cameron** (cameros@purdue.edu), Andrew Sweet and David Stanford-Beale, Purdue Univ., West Lafayette, IN

11:00 **2106** From silk fibers to shiny film: A phylogenetic and molecular analysis of the interaction between water and embiopteran silks. **J. René Harper** (jharper@scu.edu), Neeraja Sripada, Justen Whittall and Janice S. Edgerly, Santa Clara Univ., Santa Clara, CA

10-min: SysEB, Systematics, Genetics, and Morphology of Bees

Room 124 (America's Center)

Moderators: Michael Branstetter¹ and Meaghan Pimsler², ¹USDA - ARS, Logan, UT, ²Meaghan Pimsler, Univ. of Alabama, Tuscaloosa, AL

9:00 **2107** Proximate influences on caste behaviour of a eusocial sweat bee, *Lasioglossum laevissimum*. **David Awde** (davidawde@gmail.com)¹, Adonis Skandalis² and Miriam Richards², ¹Univ. of Kentucky, Lexington, KY, ²Brock Univ., St. Catharines, ON, Canada

9:10 **2108** Transcriptional regulation by vitellogenin in honey bee workers. **Gyan Harwood** (gyan.harwood@gmail.com)¹, Christine Elsik² and Gro Amdam¹, ¹Arizona State Univ., Tempe, AZ, ²Univ. of Missouri, Columbia, MO

9:20 **2109** Identification of genomic signatures across seven U.S. commercial honey bee lines using whole genome pooled sequencing. **Perot Saelao** (perot.saelao@usda.gov), Arián Avalos, Robert Danka and Michael Simone-Finstrom, USDA - ARS, Baton Rouge, LA

9:30 **2110** Genomic signatures of honey bee association in the protective symbiont *Parasaccharibacter apium*. **Eric Smith** (eas10@iu.edu), Delaney Miller and Irene Newton, Indiana Univ., Bloomington, IN

9:40 **2111** Genomic regions associated with aggressive group behavior in honey bees. **Arian Avalos** (arian.avalos@usda.gov)¹, Matthew Hudson² and Gene Robinson², ¹USDA - ARS, Baton Rouge, LA, ²Univ. of Illinois, Champaign, IL

9:50 **2112** Neural and physiological underpinnings of defense specialization in soldiers of the stingless bee *Tetragonisca angustula*. **Kaitlin Baudier** (kbaudier@asu.edu), Meghan Bennett, Jennifer H. Fewell and Theodore Pavlic, Arizona State Univ., Tempe, AZ

10:00 **2113** Species-delimitation and host-plant evolution in the oligolectic bee genus *Hesperapis* (Hymenoptera: Melittidae). **Michael Branstetter** (mgbranstetter@gmail.com)¹, Bryan N. Danforth², Jessica Gillung², Terry Griswold¹ and Denis Michez³, ¹USDA - ARS, Logan, UT, ²Cornell Univ., Ithaca, NY, ³Univ. de Mons, Mons, Belgium

Oral Presentations

10:10 **2114** Brain morphology across bee species that vary in social system. **Sarah Jaumann** (sjaumann@gwu.edu)¹ and Adam Smith², ¹The George Washington Univ., Washington, DC, ²George Washington Univ., Washington, DC

10:20 Break

10:30 **2115** Describing spatio-temporal context of pathogens affecting managed, feral, and native bees in southern California. **Amy Geffre** (ageffre@ucsd.edu), Univ. of California, La Jolla, CA

10:40 **2116** Comparative transcriptomics reveals nutritional and maturational signatures in the fat body in pre-overwintering bumblebee (*Bombus impatiens*) queens. **Claudineia Costa** (claudinpc@ucr.edu)¹, Kaleigh Fisher¹, Michelle Duennes¹, Joshua Der², Kristal Watrous¹, Naoki Okamoto¹, Naoki Yamanaka¹ and S. Hollis Woodard¹, ¹Univ. of California, Riverside, CA, ²California State Univ., Fullerton, CA

10:50 **2117** In search of an American orchid bee: Defining range, habitat, and dispersal ecology of *Eufriesea coerulescens* in the United States. **Robinson Sudan** (robinson@newleaf-tx.org), New Leaf, Lockhart, TX

11:00 **2118** Gene expression of rapid cold-shock and 24-hour recovery of a widespread montane bumble bee across elevation and latitude. **Meaghan Pimsler** (mlpimsler@gmail.com)¹, Kennan Oyen², James Herndon³, Michael Dillon⁴, James Strange⁵ and Jeffrey Lozier¹, ¹Univ. of Alabama, Tuscaloosa, AL, ²Univ. of Cincinnati, Cincinnati, OH, ³Utah State Univ., Logan, UT, ⁴Univ. of Wyoming, Laramie, WY, ⁵USDA - ARS, Logan, UT

11:10 **2119** Presentation withdrawn

11:20 **2120** The bee Big Bang: Elucidating evolutionary origins of bees with UCE phylogenomics. **Erin Kricholsky** (erin.kricholsky@ars.usda.gov)¹, Jessica Gillung², James Pitts³, Terry Griswold¹, Bryan N. Danforth², Christian Schmid-Egger⁴ and Michael Branstetter¹, ¹USDA - ARS, Logan, UT, ²Cornell Univ., Ithaca, NY, ³Utah State Univ., Logan, UT, ⁴Zoologische Staatssammlung, München, Germany

11:30 **2121** Biogeography of the giant honey bees. **Deborah Smith** (debsmith@ku.edu) and Sarah Cluff, The Univ. of Kansas, Lawrence, KS

WEDNESDAY, NOVEMBER 20, 2019 • AFTERNOON

Lunch & Learn: A Beginner's Introduction to 3D Printing for Entomologists

Room 131 (America's Center)

Moderator and Organizer: Amanda Tokash-Peters, Univ. of Massachusetts, Boston, MA

12:15 PM - 1:15 PM

Lunch & Learn: What's Your Story? Tips and Tricks for Telling Compelling Entomology

Room 130 (America's Center)

Moderators and Organizers: Katelyn Kesheimer¹, Elizabeth Dykstra², Scott O'Neal³ and Lina Bernaola⁴, ¹Auburn Univ., Auburn, AL, ²Washington State Dept. of Health, Olympia, WA, ³Univ. of Nebraska, Lincoln, NE, ⁴Louisiana State Univ., Baton Rouge, LA

12:15 PM - 1:15 PM

PBT Section Symposium: Cross-Pollination Across Sectors: A Forum on Pollinator Health and Safety

Room 266 (America's Center)

Moderators and Organizers: Katherine Karberg¹, Daniel Schmehl¹, Reed Johnson² and Sarah Wood³, ¹Bayer Crop Science, Chesterfield, MO, ²The Ohio State Univ., Wooster, OH, ³Univ. of Saskatchewan, Saskatoon, SK, Canada

1:30 Welcoming remarks

1:35 **2122** Novel controls for the honey bee parasitic mite *Varroa destructor*. **Steven Cook** (steven.cook@ars.usda.gov)¹, Troy Anderson², Rassol Bahreini³, Jennifer Berry⁴, Jay Evans¹, Joel González-Cabrera⁵, Josephine Johnson⁶, Reed Johnson⁷, Medhat Nasr³, Matthew Mulica⁸ and Geoffrey Williams⁹, ¹USDA - ARS, Beltsville, MD, ²Univ. of Nebraska, Lincoln, NE, ³Alberta Agriculture and Forestry, Edmonton, AB, Canada, ⁴Univ. of Georgia, Watkinsville, GA, ⁵Universitat de València, Burjassot, Spain, ⁶Stevenson Univ., Owings Mills, MD, ⁷The Ohio State Univ., Wooster, OH, ⁸Honey Bee Health Coalition, Keystone, CO, ⁹Auburn Univ., Auburn, AL

1:50 **2123** A laboratory system to study the effects of stressors on honey bee health and fecundity. **Julia Fine** (jdf250@psu.edu)¹, Hagai Shpigler^{1,2} and Gene Robinson¹, ¹Univ. of Illinois, Champaign, IL, ²Hebrew Univ. of Jerusalem, Jerusalem, Israel

2:05 **2124** Identifying pesticide formulations and mixtures harmful to bees. **Reed Johnson** (johnson.5005@osu.edu), The Ohio State Univ., Wooster, OH

2:20 **2125** Estimating the risk of insecticide exposure on monarch butterfly (*Danaus plexippus*) at the patch and landscape scales. **Niranjan Krishnan** (nkrish@iastate.edu), Iowa State Univ., Ames, IA

2:35 **2126** Bee pollinator toxicogenomics: A molecular approach helping to understand and predict bee pollinator safety of pesticides. **Ralf Nauen** (ralf.nauen@bayer.com)¹ and Chris Bass², ¹Bayer Crop Science, Monheim am Rhein, Germany, ²Univ. of Exeter, Penryn, United Kingdom

3:05 Break

3:20 Introductory remarks

3:25 **2127** Assessing pesticide risks to bees at national level: Processes and challenges. **Cameron Douglass** (douglass.cameron@epa.gov) and Thomas Steeger, US Environmental Protection Agency, Washington, DC

3:40 **2128** Integrating pesticide mixtures into bee ecological risk assessment. **Allen Olmsted** (allen.olmstead@basf.com), BASF Corporation, Research Triangle Park, NC

3:55 **2129** Keeping up with the latest literature when assessing safety to pollinators. **Daniel Schmehl** (daniel.schmehl@bayer.com), Bayer Crop Science, Chesterfield, MO

4:10 **2130** How can veterinary pathologists improve pollinator health? **Sarah Wood** (sarah.wood@usask.ca), Ivanna Kozi, Igor de Mattos, Colby Klein and Elemir Simko, Univ. of Saskatchewan, Saskatoon, SK, Canada

4:25 **2131** Strength in partnerships: Working together to protect monarchs and other pollinators. **Wendy Caldwell** (wcaldwell@monarchjointventure.org), Monarch Joint Venture, St. Paul, MN

4:40 Panel discussion

5:20 Concluding remarks

Oral Presentations

3:50 **2153** Using digital ag tools to encourage private landowners to engage in multispecies conservation efforts. **Ryan Heiniger** (rheiniger@pheasantsforever.org), Pheasants Forever, Inc, Burlington, IA

4:05 **2154** A report on the 25-year effort to establish the American burying beetle (*Nicrophorus americanus* Olivier) to Nantucket Island, Massachusetts. **Lou Perrotti** (lperrott@rwpzoo.org), Roger Williams Park Zoo, Providence, RI

4:20 **2155** Bee conservation in the city: Taxonomic and functional diversity. **Gerardo Camilo** (gerardo.camilo@slu.edu), Saint Louis Univ., St. Louis, MO

4:35 **2156** Rusty patched bumble bee pilot project in Iowa. **Tony Burd** (tony.burd@syngenta.com), Syngenta Crop Protection, Greensboro, NC

4:50 **2348** How climate change might affect the Karner blue butterfly. **Ralph Grundel** (rgrundel@usgs.gov), U.S. Geological Survey, Chesterton, IN

5:05 Discussion

P-IE Section Symposium: Invasion of the Spotted Lanternfly, *Lycorma delicatula*, in North America

Room 263 (America's Center)

Moderators and Organizers: Kelli Hoover and Julie Urban, Pennsylvania State Univ., University Park, PA

1:30 Introductory remarks

1:35 **2157** Notes on management of the spotted lanternfly. **Richard Roush** (rtr10@psu.edu)¹, Dennis D. Calvin¹, Thomas C. Baker¹, Ann E. Hajek² and Julie Urban¹, ¹Pennsylvania State Univ., University Park, PA, ²Cornell Univ., Ithaca, NY

1:50 **2158** Spotted lanternfly damage and phenology in fruit crops. **Heather Leach** (hll50@psu.edu)¹, Michela Centinari¹, David Biddinger² and Julie Urban¹, ¹Pennsylvania State Univ., University Park, PA, ²Pennsylvania State Univ. Fruit Research and Extension Center, Biglerville, PA

2:05 **2159** Addressing the expansion of range of spotted lanternfly in Virginia, and impacts on tree species. **Douglas G. Pfeiffer** (dgpfeiff@vt.edu), Eric R. Day, Theresa Dellinger, Andrew Dechaine, Scott Salom and Thomas Kuhar, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

2:20 **2160** Host preference and performance of spotted lanternfly among common woody ornamentals. **Kelli Hoover** (kxh25@psu.edu), Osariyekemwen Uyi, Joseph Keller and Anne Johnson, Pennsylvania State Univ., University Park, PA

2:35 **2161** Dispersal capacity of nymphal *Lycorma delicatula* in varied habitats. **Dalton Ludwick** (daltonludwick@gmail.com)^{1,2}, Laura Nixon² and Tracy C. Leskey², ¹Virginia Polytechnic Institute and State Univ., Kearneysville, WV, ²USDA - ARS, Kearneysville, WV

2:50 **2162** Spotted lanternfly endosymbionts and reproductive development. **Julie Urban** (jmu2@psu.edu) and Dana Roberts, Pennsylvania State Univ., University Park, PA

3:05 Break

3:20 **2163** What we know so far about how feeding and mating are related to *Lycorma delicatula* flight dispersal behavior. **Thomas C. Baker** (tcb10@psu.edu), Pennsylvania State Univ., University Park, PA

3:35 **2164** Behavior and chemical ecology of spotted lanternfly. **Miriam Cooperband** (miriam.f.cooperband@aphis.usda.gov), USDA - APHIS, Buzzards Bay, MA

3:50 **2165** Development of biological control methods against spotted lanternfly: Research on an egg and a nymphal parasitoid. **Hannah Broadley** (hbroadley@cns.umass.edu)¹, Juli Gould², Xiao-Yi Wang³, Kim Hoelmer⁴ and Charles Bartlett⁵, ¹Univ. of Massachusetts, Amherst, MA, ²USDA - APHIS, Buzzards Bay, MA, ³Chinese Academy of Forestry, Beijing, China, ⁴USDA - ARS, Newark, DE, ⁵Univ. of Delaware, Newark, DE

4:05 **2166** Fungal entomopathogens infecting spotted lanternflies. **Eric Clifton** (ehc87@cornell.edu) and Ann E. Hajek, Cornell Univ., Ithaca, NY

4:20 **2167** Controlling spotted lanternfly with insecticides and biopesticides in fruit crops and possible impacts on pollinators and other non-target insects. **David Biddinger** (djb134@psu.edu)¹, Heather Leach², Fang Zhu², Julie Urban² and Ann E. Hajek³, ¹Pennsylvania State Univ. Fruit Research and Extension Center, Biglerville, PA, ²Pennsylvania State Univ., University Park, PA, ³Cornell Univ., Ithaca, NY

4:35 Intermission

4:50 Discussion

5:10 Poster session

SD2168 Nymphal spotted lanternfly responses to temperature. **Devin Kreitman** (dak227@scarletmail.rutgers.edu)¹, Melody A. Keena² and Anne Nielson¹, ¹Rutgers, The State Univ. of New Jersey, Bridgeton, NJ, ²USDA - Forest Service, Hamden, CT

SD2169 Effect of temperature on the developmental biology of spotted lanternfly. **Erica Smyers** (ecs5026@psu.edu), Dennis D. Calvin and Julie Urban, Pennsylvania State Univ., University Park, PA

P-IE Section Symposium: The Larry Larson Symposium: Fall Armyworm, *Spodoptera frugiperda* (J.E. Smith), Invasion in Africa and Asia: A Cooperative Effort to Design Integrated Pest Management Programs

Room 265 (America's Center)

Moderators and Organizers: Luis E. Gomez¹, Boris A. Castro² and Amanda Jacobson², ¹Corteva Agriscience, Carmel, IN, ²Corteva Agriscience, Indianapolis, IN

1:30 Welcoming remarks

1:35 **2170** Fall armyworm in Africa and Asia: Status and management strategies. **Prasanna Boddupalli** (b.m.prassanna@cgiar.org), CIMMYT & CGIAR, Nairobi, Kenya

2:05 **2171** Smallholder management of fall armyworm in Africa and Asia. **Allan Hruska** (allan.hruska@fao.org), Food and Agriculture Organization of the United Nations, Rome, Italy

2:35 **2172** Fall armyworm technical educational and training campaigns for Asia and Africa: Developing learning tools for stakeholders and growers to address the invasion of this pest with knowledge and technology. **Boris A. Castro** (boris.castro@corteva.com)¹, Suhrid Barik², Marlin Rice³, Samanwong Somsak⁴, Pankaj Sharma², Luis E. Gomez⁵, Clint Pilcher³, Xinpei Huang¹, Stephen Smith¹ and Terry Wright¹, ¹Corteva Agriscience, Indianapolis, IN, ²Corteva Agriscience, Hyderabad, India, ³Corteva Agriscience, Johnston, IA, ⁴Corteva Agriscience, Bangkok, Thailand, ⁵Corteva Agriscience, Carmel, IN

Oral Presentations

Wednesday, November 20

2:50 **2173** Resistance of *Spodoptera frugiperda* to insecticides and Bt crops: Key recommendations to Africa and Asia IPM strategies. **Celso Omoto** (celso.omoto@usp.br), Anderson Bolzan, Antonio Rogério Nascimento and Eloisa Salmeron, Univ. de São Paulo, Piracicaba, Brazil

3:20 Break

3:35 **2174** Areawide insecticide resistance management strategies for fall armyworm in corn in Puerto Rico. **Hector E. Portillo** (hector.portillo@fmc.com)¹, Henry Teran Santofimio², Caydee Savinelli³, Anthony Burd⁴, Jaime Sanchez², Sol Rosado-Arroyo⁵, Jim Johnson⁶, Graham P. Head⁷, Rodney N. Nagoshi⁸, David Mota-Sanchez⁹ and Christian Salcedo¹⁰, ¹FMC Agricultural Solutions, Newark, DE, ²Corteva Agriscience, Salinas, PR, ³Syngenta Plant Protection, Greensboro, NC, ⁴Syngenta Crop Protection, Greensboro, NC, ⁵BASF Puerto Rico, Guanica, PR, ⁶Syngenta Crop Protection, Perry, MI, ⁷Bayer Crop Science, Chesterfield, MO, ⁸USDA - ARS, Gainesville, FL, ⁹Michigan State Univ., East Lansing, MI, ¹⁰Syngenta, Vero Beach, FL

4:05 **2175** Understanding fall armyworm management and IPM strategies in Asia and Africa. **Samuel Martinelli** (samuel.martinelli@bayer.com)¹, Nigel Godley², Hartwig Dauck² and Graham P. Head¹, ¹Bayer Crop Science, Chesterfield, MO, ²Bayer AG, Monheim am Rhein, Germany

4:20 **2176** *Spodoptera frugiperda*: Opportunities to partner in shaping future management of this pest. **Clint Pilcher** (clint.pilcher@corteva.com)¹, Marlin Rice¹, Boris A. Castro², Jennifer Billings³, Timothy M. Nowatzki¹, Dwain Rule², Melissa Siebert⁴, Amit Sethi¹, James Bing¹, Analiza Piovesan Alves¹ and Jian-Zhou (Joe) Zhao¹, ¹Corteva Agriscience, Johnston, IA, ²Corteva Agriscience, Indianapolis, IN, ³Corteva Agriscience, Washington, DC, ⁴Corteva Agriscience, Greenville, MS

4:35 **2177** *Bacillus thuringiensis*: A low-risk IPM tool for fall armyworm control. **Daniel Zommick** (daniel.zommick@valentbiosciences.com), Valent Biosciences LLC, Libertyville, IL

4:50 Concluding remarks

Member Symposium: Advances in Hemipteran Biology and Control

Room 132 (America's Center)

Moderators and Organizers: Colin Brent¹ and Brian Hogg², ¹USDA - ARS, Maricopa, AZ, ²USDA - ARS, Albany, CA

1:30 **2178** Biological control of bagrada bug in northern California. **Brian Hogg** (brian.hogg@ars.usda.gov)¹, Ian Grettnerberger² and Charles H. Pickett³, ¹USDA - ARS, Albany, CA, ²Univ. of California, Davis, CA, ³California Dept. of Food and Agriculture, Sacramento, CA

1:45 **2179** Using a simulation model to help quantify the economic impact of *Peristenus relictus* establishment on host *Lygus* spp. populations in California strawberry. **Diego J. Nieto** (dnieto@ucsc.edu)¹, Emily Bick² and Charles H. Pickett³, ¹Driscoll's, Watsonville, CA, ²Univ. of California, Davis, CA, ³California Dept. of Food and Agriculture, Sacramento, CA

2:00 **2180** Mating disruption for vine mealybug, *Planococcus ficus*, the path from basic research to commercial application. **Kent Daane** (kdaane@ucanr.edu)¹, Jocelyn G. Millar², Monica Cooper³, Vaughn Walton⁴, Brian Hogg⁵, Elizabeth Boyd⁶ and David Haviland⁷, ¹Univ. of California, Parlier, CA, ²Univ. of California, Riverside, CA, ³Univ. of California, Napa, CA, ⁴Oregon State Univ., Corvallis, OR, ⁵USDA - ARS, Albany, CA, ⁶California State Univ., Chico, CA, ⁷Univ. of California Cooperative Extension, Bakersfield, CA

2:15 **2181** Diversity of bacterial symbionts of stink bugs and their associations across the Pentatomidae. **Alejandro Otero-Bravo** (oterobravo.1@buckeyemail.osu.edu) and Zakee Sabree, The Ohio State Univ., Columbus, OH

2:30 **2182** Developing decision support tools for the invasive BMSB in orchard agroecosystems. **John Cullum** (john29@vt.edu)¹, Brent Short² and Tracy C. Leskey³, ¹Virginia Polytechnic Institute and State Univ., Winchester, VA, ²Trécé Inc., Adair, OK, ³USDA - ARS, Kearneysville, WV

2:45 **2183** Directing harlequin bug movement for vegetable pest management. **Anna K. Wallingford** (anna.wallingford@unh.edu)¹, Alexander Bier² and Donald C. Weber², ¹Univ. of New Hampshire, Durham, NH, ²USDA - ARS, Beltsville, MD

3:00 **2184** Predation of sentinel stink bug eggs measured through imaging. **Charles H. Pickett** (cpickett@cdfa.ca.gov)¹, Christopher J. Borkent¹, Viola Popescu¹, Ian Grettnerberger² and Brian Hogg³, ¹California Dept. of Food and Agriculture, Sacramento, CA, ²Univ. of California, Davis, CA, ³USDA - ARS, Albany, CA

3:15 **2185** EPG feeding studies enable novel host plant resistance against leafhopper pests. **Elaine Backus** (elaine.backus@ars.usda.gov), USDA - ARS, Parlier, CA

3:30 Break

3:45 **2186** Successes and challenges for biological control of recent invasive Hemiptera: BMSB and spotted lanternfly as examples. **Kim Hoelmer** (kim.hoelmer@ars.usda.gov)¹, Juli Gould² and Hannah Broadley³, ¹USDA - ARS, Newark, DE, ²USDA - APHIS, Buzzards Bay, MA, ³Univ. of Massachusetts, Amherst, MA

4:00 **2187** Untarnished reputation of the western tarnished plant bug, *Lygus hesperus*: Neuropeptide targets for management of a non-model insect. **Andrew Nuss** (nuss@cabnr.unr.edu)¹, Devin Mazolewski¹, Joe Hull², Colin Brent² and Rana Pooraiioub¹, ¹Univ. of Nevada, Reno, NV, ²USDA - ARS, Maricopa, AZ

4:15 **2188** Chemical and biological control strategies for suppressing tarnished plant bug population in mid-south row crops. **Y.C. Zhu** (yczhu@ars.usda.gov) and Maribel Portilla, USDA - ARS, Stoneville, MS

4:30 **2189** A mobile marauder: How the bagrada bug becomes a pest. **Ian Grettnerberger** (imgrettnerberger@ucdavis.edu)¹ and Shimat Joseph², ¹Univ. of California, Davis, CA, ²Univ. of Georgia, Griffin, GA

4:45 **2190** Understanding pentatomid pheromone biochemistry for developing new pest management strategies. **Dorothea Tholl** (tholl@vt.edu)¹, Jason Lancaster¹, Bryan Lehner¹, Ashot Khrimian², Saikat Kumar Ghosh², Anna K. Wallingford³, Donald C. Weber², Michael E. Sparks², Dawn Gunderson-Rindal² and Thomas Kuhar¹, ¹Virginia Polytechnic Institute and State Univ., Blacksburg, VA, ²USDA - ARS, Beltsville, MD, ³Univ. of New Hampshire, Durham, NH

5:00 **2191** Using the protein mark-capture technique to track true bug pest and predator movement in trap-cropped agroecosystems. **James Hagler** (james.hagler@ars.usda.gov), USDA - ARS, Maricopa, AZ

5:15 **2192** Pheromonal regulation of reproduction in Lygus bugs. **Colin Brent** (colin.brent@ars.usda.gov), USDA - ARS, Maricopa, AZ

Oral Presentations

SD2217 NASA GLOBE Observer mosquito habitat mapper.
Russanne Low (rusty_low@strategies.com) and Theresa Schwerin, Institute for Global Environmental Strategies, Arlington, VA

3:00 **2218** Opportunities and challenges for entomology in the crop protection industry: Delivering and communicating societal benefits. **Michelle Smith** (michelle.smith-1@corteva.com), Corteva Agriscience, Indianapolis, IN

3:15 **2219** Commercialization as a path to societal impacts for entomological science. **Nina Jenkins** (nej2@psu.edu), Pennsylvania State Univ., University Park, PA

3:30 **2220** Future perspectives for entomology in the regulatory sector: Opportunities and challenges to protect agricultural health. **Lisa Knolhoff** (lisa.knolhoff@aphis.usda.gov), USDA - APHIS, Riverdale, MD

3:45 **2221** Opportunities and challenges for entomologists in the government sector: The USDA-ARS research mission. **Alvin Simmons** (alvin.simmons@ars.usda.gov), USDA - ARS, Charleston, SC

4:00 Break and poster session

4:30 **2222** Entomology in education: Insect science as a tool to engage students and promote scientific literacy. **Faith Weeks** (fweeks@towson.edu), Towson Univ., Towson, MD

4:45 **2223** Latin America industry interactions with society – Agrochemical concepts and public perception. **Rosana Serikawa** (rosana.serikawa@corteva.com), Corteva Agriscience, Johnston, IA

5:00 **SP2224** Citizen scientists as agents of change: NASA GLOBE Observer mosquito habitat mapper. **Russanne Low** (rusty_low@strategies.org) and Theresa Schwerin, Institute for Global Environmental Strategies, Arlington, VA

5:10 **SP2225** A virtual gaming experience to engage players in insect conservation: Butterfly World 1.0. **Jaeson Clayborn** (jclay010@fiu.edu) and Alban Delamarre, Florida International Univ., Miami, FL

5:20 Panel discussion

Member Symposium: Advocating for Insects as Food and Feed

Room 242 (America's Center)

Moderator and Organizer: Elida Espinoza, EnviroFlight LLC, Yellow Springs, OH

1:30 Introductory remarks

1:35 **2226** State of the field: Insects as food and feed. **Elida Espinoza** (ellyspnz@gmail.com), EnviroFlight LLC, Yellow Springs, OH

1:50 **2227** Outreach for the insects as food and feed industry: Creating a foundation of consumers. **Jeffery K. Tomberlin** (jktomberlin@tamu.edu), Texas A&M Univ., College Station, TX

2:05 **2228** Supply chain thinking for insect farming. **Virginia Emory** (virginia@betahatch.com), Beta Hatch, Seattle, WA

2:20 **2229** The participation by lesser mealworms as agents of retention and dispersal of pathogenic bacteria. **Tawni L. Crippen** (tawni.crippen@ars.usda.gov), USDA - ARS, College Station, TX

2:35 **2230** Integrated pest management on cricket farms. **James Ricci** (james@ovipost.com), Ovipost, LaBelle, FL

2:50 Break

3:05 **2231** Forget big ag, let's talk about bugag - why insect agriculture is a 100 billion dollar market opportunity. **Robert Allen** (rna0014@gmail.com), Little Herds, Austin, TX

3:20 **2232** Reducing the costs of insect production by incorporating agricultural by-products in diet formulations. **Juan Morales-Ramos** (juan.moralesramos@ars.usda.gov) and M. Guadalupe Rojas, USDA - ARS, Stoneville, MS

3:35 **2233** Expanding awareness and acceptance of insects as food, feed, and beyond. **Cheryl Preyer** (cheryl.preyer@gmail.com), North American Coalition for Insect Agriculture, St. Louis, MO

3:50 **2234** Regulatory status of insects as animal feed and human food. **Alejandra McComb** (amccomb@enviroflight.net), EnviroFlight LLC, Yellow Springs, OH

4:05 **2235** Insects in managed wildlife/exotic animal feeding programs. **Ellen Dierenfeld** (edierenfeld@aol.com), Ellen S. Dierenfeld, LLC, St. Louis, MO; Nottingham Trent Univ., Southwell, United Kingdom

4:35 **SP2236** Using USA *Neoconocephalus triops* (conehead grasshopper) as a model to study *Ruspolia differens*: An edible delicacy in East Africa. **Francoise Favi** (ffavi@vsu.edu)¹, Ronald Bowen¹ and Buagu Musazi², ¹Virginia State Univ., Petersburg, VA, ²Morgan State Univ., Baltimore, MD

4:45 **SP2237** Moving the needle with edible insects: Enhancing adoption through education and experience. **Sujaya Rao** (sujaya@umn.edu) and Olivia Olson, Univ. of Minnesota, St. Paul, MN

4:55 **SP2238** A shift in paradigms on insect pathology from the study of mass rearing insects as biocontrol to the study of mass rearing insects for feed. **Genoveva Rodriguez-Castaneda** (geno@betahatch.com)¹, Hans Kelstrup¹, Juan Morales-Ramos² and Virginia Emery¹, ¹Beta Hatch, SeaTac, WA, ²USDA - ARS, Stoneville, MS

5:05 Discussion

5:25 Concluding remarks

Member Symposium: Finding Common Ground: Non-chemical Pest-Management to Protect Organic and Conventional Crops

Room 264 (America's Center)

Moderators and Organizers: Amber Sciligo¹ and David Gonthier², ¹The Organic Center, Washington, DC, ²Univ. of Kentucky, Lexington, KY

1:30 Welcoming remarks

1:35 **2239** Organic solutions to control citrus greening disease and its vector, the Asian citrus psyllid (*Diaphorina citri* Kuwayama). **Amber Sciligo** (asciligo@organic-center.org) and Jessica Shade, The Organic Center, Washington, DC

1:50 **2240** Holistic pest management for organic grain and cotton crops in the U.S. **Kathleen Delate** (kdelate@iastate.edu), Iowa State Univ., Ames, IA

2:05 **2241** Assessing push-pull as a management strategy for social wasps in vineyards. **Christelle Guédot** (guedot@wisc.edu) and Abby Lois, Univ. of Wisconsin, Madison, WI

Wednesday, November 20

Oral Presentations

2:20 **2242** When enemies are friends: Conservation biocontrol of *Lygus hesperus* in organic strawberries. **Adrian Lu** (adhl@berkeley.edu)¹, David Gonthier², Amber Sciligo³, Karina Garcia², Gilla Juarez⁴, Taiki Chiba⁵, Fang Ouyang⁶ and Claire Kremen¹, ¹Univ. of California, Berkeley, CA, ²Univ. of Kentucky, Lexington, KY, ³The Organic Center, Washington, DC, ⁴NatureBridge, Yosemite National Park, El Portal, CA, ⁵PricewaterhouseCoopers Japan, Tokyo, Japan, ⁶Chinese Academy of Sciences, Beijing, China

2:35 **2243** Landscape influences on spotted-wing drosophila (*Drosophila suzukii*) in central Kentucky. **Ryan Kuesel** (r.kuesel@uky.edu), Kendall Archer and David Gonthier, Univ. of Kentucky, Lexington, KY

2:50 Panel discussion

3:10 Break

3:25 Welcoming remarks for 2nd half

3:30 **2244** Using physical barriers and essential oils for broad pest control in specialty crops. **David Gonthier** (dgo227@g.uky.edu)¹, Ryan Kuesel¹, Robert Brockman¹, Kendall Archer¹, Kyla O'Hearn¹, Delia Scott Hicks¹, Neil Wilson¹, Amber Sciligo², Ric Bessin³ and Mark A. Williams¹, ¹Univ. of Kentucky, Lexington, KY, ²The Organic Center, Washington, DC, ³Univ. of Kentucky, Princeton, KY

3:45 **2245** Can we blind, confuse, or outnumber them? Cultural and biological control tactics to manage insect pests in organic vegetable production. **Ada Szczepaniec** (ada.szczepaniec@ag.tamu.edu) and Charles Rush, Texas A&M Univ., Amarillo, TX

4:00 **2246** Mass-trapping codling moth (*Cydia pomonella*) using a kairomone lure reduces apple damage in trees in orchards, but not outside orchard environments. **Benjamin Jaffe** (bjaffe2@wisc.edu)¹, Peter J. Landolt² and Christelle Guédot¹, ¹Univ. of Wisconsin, Madison, WI, ²USDA - ARS, Wapato, WA

4:15 **2247** The effects of two flowering companion plant species on the abundance and diversity of predatory mites (Phytoseiidae) in sustainable watermelon production. Monica Farfan¹, **John Coffey** (coffey5@clemson.edu)¹ and Rebecca Schmidt-Jeffris², ¹Clemson Univ., Charleston, SC, ²USDA - ARS, Wapato, WA

4:30 **2248** Integrating harvest timing and biological control to manage alfalfa weevil. **Randa Jabbour** (rjabbour@uwyo.edu), Univ. of Wyoming, Laramie, WY

4:45 Panel discussion

5:05 Concluding remarks

Member Symposium: Next-Gen Scientists: Mentorship and Teaching Strategies to Advocate for Undergraduate Entomology Education

Room 260 (America's Center)

Moderators and Organizers: Carly Tribull¹, David Serrano², Stephanie Mafla Mills³, Scott O'Neal⁴ and Katelyn Kesheimer⁵, ¹Farmingdale State College, Farmingdale, NY, ²Broward College, Davie, FL, ³Rutgers, The State Univ. of New Jersey, Newark, NJ, ⁴Univ. of Nebraska, Lincoln, NE, ⁵Auburn Univ., Auburn, AL

1:30 Welcoming remarks

1:35 **2249** Active learning for the reluctant instructor. **Terry McGlynn** (terry.mcglynn@gmail.com), California State Univ., Carson, CA

1:50 **2250** Let's discuss! Promoting, assessing, and evaluating classroom discussions in large and small classes. **Tania N. Kim** (tkim@ksu.edu), Jeremy L. Marshall, Brian McCornack and Kristopher Silver, Kansas State Univ., Manhattan, KS

2:05 **2251** Presentation withdrawn

2:05 Looking towards the future of the undergraduate teaching and research symposium

2:20 **2252** Improve it or lose it: Modifying and updating biology labs. **Tanya Josek** (josek1@illinois.edu), Illinois State Univ., Bloomington, IL

2:35 **2253** Replacing words with images: Measuring the impacts of an OER comic textbook in undergraduate classes. **Carly Tribull** (cmtribull@gmail.com), Farmingdale State College, Farmingdale, NY

2:50 **SP2254** Insects in Italy: How not to advertise a study abroad course. **Phillip E. Kaufman** (pkaufman@ufl.edu) and Jennifer Gillett-Kaufman, Univ. of Florida, Gainesville, FL

3:00 Break

3:15 **2255** Bugs and people: Ideas to engage undergraduates in a large enrollment face-to-face class. **Rebecca Baldwin** (baldwinr@ufl.edu), Univ. of Florida, Gainesville, FL

3:30 **2256** Collection-based education by distance and face to face: Learning outcomes and academic dishonesty. **Andrea Lucky** (alucky@ufl.edu), Marc Branham and Rachel Atchison, Univ. of Florida, Gainesville, FL

3:45 **2257** The mentorship syllabus: Structuring learning outcomes for undergraduate researchers. **Meghan Barrett** (mrb397@drexel.edu), Drexel Univ., Philadelphia, PA

4:00 **2258** Enriching undergraduate research experiences by improving mentorship training. **Helen McCreery** (hmccreery@seas.harvard.edu)¹, Amanda Hund² and Elizabeth Scordato³, ¹Harvard Univ., Cambridge, MA, ²Univ. of Minnesota, Minneapolis, MN, ³California State Polytechnic Univ., San Luis Obispo, CA

4:15 **2259** Lessons learned and best practices from our first 3 years of a 5-year NSF s-STEM grant. **David Serrano** (dserrano@broward.edu) and Christine Sammon, Broward College, Davie, FL

4:30 **2260** The power of diversity in generating transformative learning experiences for STEM undergraduate researchers. **Kasey Fowler-Finn** (kasey.fowlerfinn@slu.edu), Saint Louis Univ., St. Louis, MO

4:45 Workshop: ENTODiversity: Diversifying insect bio from field to phylo with Stephanie Mafla-Mills

5:15 Panel discussion

Member Symposium: Population Genetics and Pest Control: Advocating a Leading Role for Entomologists

Room 280 (America's Center)

Moderators and Organizers: Jennifer Baltzgar¹ and Megan Fritz², ¹North Carolina State Univ., Raleigh, NC, ²Univ. of Maryland, College Park, MD

1:30 Welcoming remarks

Oral Presentations

1:35	2261	Promise and pitfalls of Bt-crop pyramids for managing pest resistance. Yves Carrière (ycarrier@ag.arizona.edu) and Bruce Tabashnik, Univ. of Arizona, Tucson, AZ
1:50	2262	Extreme diversity in pink bollworm Bt-resistance genes and transcripts: Challenges for molecular monitoring. Jeffrey Fabrick (jeff.fabrick@ars.usda.gov), USDA - ARS, Maricopa, AZ
2:05	2263	Genomic responses to selection by Bt crops in two lepidopteran species. Megan Fritz (mfritz13@umd.edu), Univ. of Maryland, College Park, MD
2:20	2264	Eco-evolutionary dynamics in noctuid moth pests. Astrid Groot (a.t.groot@uva.nl), Univ. of Amsterdam, Amsterdam, Netherlands
2:35	2265	Population genetics of the two host strains of fall armyworm and its relevance to pest control. David Heckel (heckel@ice.mpg.de), Max Planck Institute for Chemical Ecology, Jena, Germany
2:50		Break
3:05	2266	How eDNA can change the way we detect and respond to invasive insect pests. Rafael E. Valentin (raf.e.valentin@gmail.com), Rutgers, The State Univ. of New Jersey, New Brunswick, NJ
3:20	2267	Can haplotype data guide management programs for tree fruit pests? Anne Nielsen (nielsen@njaes.rutgers.edu) ¹ , Rafael E. Valentin ² , Dina Fonseca ² , Julie Lockwood ² and Jessica Ware ³ , ¹ Rutgers, The State Univ. of New Jersey, Bridgeton, NJ, ² Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, ³ Rutgers, The State Univ. of New Jersey, Newark, NJ
3:35	2268	Application of population genomics to study crop pests in Brazil. Erick Cordeiro (cordeiro.emg@gmail.com), Univ. de São Paulo, Piracicaba, Brazil
3:50	2269	Genetic diversity of <i>Aedes aegypti</i> and close relatives: Evidence for the origin of the Aegypti Group in the southwestern Indian Ocean. John Soghigian (john.soghigian@gmail.com), Clark Univ., Worcester, MA
4:05	2270	Ecological genomics informs the control of disease vectors and agricultural pests. Gordana Rasic (gordana.rasic@qimrberghofer.edu.au), QIMR Berghofer Medical Research Institute, Brisbane, QLD, Australia
4:20	2271	Tethered homing gene drives: A new design for spatially restricted population replacement and suppression. Sumit Dhole (ssdhole@ncsu.edu), North Carolina State Univ., Raleigh, NC
4:35		Concluding remarks
1:45	2273	Herbivory through the ages: Herbarium specimens for determining effects of plant traits on changing insect damage to plants. Emily Meineke (emily_meineke@fas.harvard.edu) ¹ , Charles Davis ¹ and T. Davies ² , ¹ Harvard Univ., Cambridge, MA, ² The Univ. of British Columbia, Vancouver, BC, Canada
2:00	2274	The dark side of light: Artificial light as a disturbance to arthropod communities. Brett Seymour (brett.seymoure@gmail.com) ^{1,2,3,4} , Anthony Dell ^{1,2} , Kasey Fowler-Finn ^{1,3} and Amanda Koltz ^{1,4} , ¹ Living Earth Collaborative, St. Louis, MO, ² National Great Rivers Research and Education Center, East Alton, IL, ³ Saint Louis Univ., St. Louis, MO, ⁴ Washington Univ., St. Louis, MO
2:15	2275	Bee-microbe symbioses are influenced by fungicides and heat. Shawn Steffan (steffan@entomology.wisc.edu) and Prarthana Dharampal, Univ. of Wisconsin, Madison, WI
2:30	2276	Physiological approaches to understanding the effects of urban warming on bees and pollinator food webs. Kevin McCluney (kmclun@bgsu.edu), Justin Burdine and Melissa Seidel, Bowling Green State Univ., Bowling Green, OH
2:45		Break
3:00	2277	Arthropod communities differ across an elevational gradient in Denali National Park, Alaska. Adam Haberski (ahaberski@alaska.edu) ¹ , Derek Sikes ¹ and Jessica Rykken ² , ¹ Univ. of Alaska, Fairbanks, AK, ² US National Park Service, Denali, AK
3:15	2278	Wolf spider trophic niche and stoichiometry vary with population density and climatic conditions in the Arctic. Amanda Koltz (amanda.koltz@gmail.com) ¹ , Joseph Bowden ² , Jean-Claude Kresse ³ and Toke Høye ⁴ , ¹ Washington Univ., St. Louis, MO, ² Canadian Forest Service, Corner Brook, NF, Canada, ³ Aarhus Univ., Aarhus, Denmark, ⁴ Aarhus Univ., Rønde, Denmark
3:30	2279	Aquatic insects alter terrestrial ecosystems: Lessons from subarctic Iceland. Matthew McCary (matt.mccary@gmail.com), Jamieson Botsch, Randall Jackson and Claudio Gratton, Univ. of Wisconsin, Madison, WI
3:45	2280	Emerging mosquitoes from tundra ponds impact the population dynamics of <i>Pardosa glacialis</i> (Araneae: Lycosidae). Lauren Culler (lauren.e.culler@dartmouth.edu), Alexandra Stendahl, Hanna Bliska and Matthew Ayres, Dartmouth College, Hanover, NH
4:00	2281	Climate sensitivity of tundra plant-pollinator interactions tracked by computer vision. Hjalte Mann (mann@bios.au.dk) ¹ , Johanna Årje ² , Alexandros Iosifidis ¹ and Toke Høye ^{1,3} , ¹ Aarhus Univ., Aarhus, Denmark, ² Tampere Univ., Tampere, Finland, ³ Aarhus Univ., Rønde, Denmark
4:15	2282	Automatic identification of arctic arthropods.

Member Symposium: Recent Approaches to Studying Invertebrate Responses to Rapid Environmental Change

Room 125 (America's Center)

Moderators and Organizers: Amanda Koltz¹, Lauren Culler² and Toke Høye³, ¹Washington Univ., St. Louis, MO, ²Dartmouth College, Hanover, NH, ³Aarhus Univ., Rønde, Denmark

1:30 Introductory remarks

1:30 **2272** Using citizen science to track earthworm distributions and spread. **Erin Cameron** (erin.cameron@smu.ca)^{1,2}, Abhilash Nair² and Mar Cabeza², ¹Saint Mary's Univ., Halifax, NS, Canada, ²Univ. of Helsinki, Helsinki, Finland

1:45 **2273** Herbivory through the ages: Herbarium specimens for determining effects of plant traits on changing insect damage to plants. **Emily Meineke** (emily_meineke@fas.harvard.edu)¹, Charles Davis¹ and T. Davies², ¹Harvard Univ., Cambridge, MA, ²The Univ. of British Columbia, Vancouver, BC, Canada

2:00 2274 The dark side of light: Artificial light as a disturbance to arthropod communities. **Brett Seymoure** (brett.seymoure@gmail.com)^{1,2,3,4}, Anthony Dell^{1,2}, Kasey Fowler-Finn^{1,3} and Amanda Koltz^{1,4}, ¹Living Earth Collaborative, St. Louis, MO, ²National Great Rivers Research and Education Center, East Alton, IL, ³Saint Louis Univ., St. Louis, MO, ⁴Washington Univ., St. Louis, MO

2:15 **2275** Bee-microbe symbioses are influenced by fungicides and heat. **Shawn Steffan** (steffan@entomology.wisc.edu) and Prarthana Dharampal, Univ. of Wisconsin, Madison, WI

2:30 **2276** Physiological approaches to understanding the effects of urban warming on bees and pollinator food webs. **Kevin McCluney** (kmclun@bgsu.edu), Justin Burdine and Melissa Seidel, Bowling Green State Univ., Bowling Green, OH

2:45 Break

3:00 **2277** Arthropod communities differ across an elevational gradient in Denali National Park, Alaska. **Adam Haberski** (ahaberski@alaska.edu)¹, Derek Sikes¹ and Jessica Rykken², ¹Univ. of Alaska, Fairbanks, AK, ²US National Park Service, Denali, AK

3:15 **2278** Wolf spider trophic niche and stoichiometry vary with population density and climatic conditions in the Arctic. **Amanda Koltz** (amanda.koltz@gmail.com)¹, Joseph Bowden², Jean-Claude Kresse³ and Toke Høye⁴, ¹Washington Univ., St. Louis, MO, ²Canadian Forest Service, Corner Brook, NF, Canada, ³Aarhus Univ., Aarhus, Denmark, ⁴Aarhus Univ., Rønde, Denmark

3:30 **2279** Aquatic insects alter terrestrial ecosystems: Lessons from subarctic Iceland. **Matthew McCary** (matt.mccary@gmail.com), Jamieson Botsch, Randall Jackson and Claudio Gratton, Univ. of Wisconsin, Madison, WI

3:45 **2280** Emerging mosquitoes from tundra ponds impact the population dynamics of *Pardosa glacialis* (Araneae: Lycosidae). **Lauren Culler** (lauren.e.culler@dartmouth.edu), Alexandra Stendahl, Hanna Bliska and Matthew Ayres, Dartmouth College, Hanover, NH

4:00 **2281** Climate sensitivity of tundra plant-pollinator interactions tracked by computer vision. **Hjalte Mann** (mann@bios.au.dk)¹, Johanna Ärje², Alexandros Iosifidis¹ and Toke Høye^{1,3}, ¹Aarhus Univ., Aarhus, Denmark, ²Tampere Univ., Tampere, Finland, ³Aarhus Univ., Rønde, Denmark

4:15 **2282** Automatic identification of arctic arthropods.
Johanna Ärje (johanna.arje@tuni.fi)¹, Alexandros Iosifidis², Kristian Meissner³, Jenni Raitioharju¹, Sigurd Agerskov Madsen², Mads Rosenhoj Jeppesen², Claus Melvad², Ville Tirronen⁴ and Toke Høye^{2,5}, ¹Tampere Univ., Tampere, Finland, ²Aarhus Univ., Aarhus, Denmark, ³Finnish Environment Institute, Helsinki, Finland, ⁴Univ. of Jyväskylä, Jyväskylä, Finland, ⁵Aarhus Univ., Rønde, Denmark

Member Symposium: Recent Innovations in Post-Harvest Entomology: Improving Food Security in an Era of Globalized Agriculture

Room 123 (America's Center)

Moderators and Organizers: Erin Scully¹ and Valerie Nguyen²,
¹USDA - ARS, Manhattan, KS, ²Kansas State Univ., Manhattan, KS

Oral Presentations

1:30 **2283** Evolution of approach to insect genome assembly: Building super genomes. **Brenda Oppert** (bso@ksu.edu), USDA - ARS, Manhattan, KS

1:45 **2284** Behavioral effects of natural extracts and their components on *Trogoderma* larvae. **Michael Domingue** (michael.j.domingue@usda.gov)¹, William Morrison² and Scott W. Myers¹, ¹USDA - APHIS, Buzzards Bay, MA, ²USDA - ARS, Manhattan, KS

2:00 **2285** Challenges in improving use of semiochemical for monitoring and control of phycitine stored-products moth pests. **Charles Burks** (charles.burks@ars.usda.gov)¹ and Leanage Wijayarathne², ¹USDA - ARS, Parlier, CA, ²Univ. of Colombo, Colombo, Sri Lanka

2:15 **2286** Understanding delays in mating and the importance of the female response. **Alison Gerken** (alison.gerken@ars.usda.gov) and James Campbell, USDA - ARS, Manhattan, KS

2:30 **2287** Testing stored product insects for phosphine resistance with the Detia-Degesch Phosphine Resistance Test Kit. **Dan Brabec** (dan.brabec@ars.usda.gov)¹, Christos Athanassiou², James Campbell¹, Nickolas Kavallieratos³ and Brenda Oppert¹, ¹USDA - ARS, Manhattan, KS, ²Univ. of Thessaly, Nea Ionia, Greece, ³Agricultural Univ. of Athens, Attica, Greece

2:45 **2288** The use of carbon dioxide to treat commodities for stored product pests: Practical consideration. **Jeffrey A. Weier** (jweier@spraguepest.com) and Ashley E. Roden, Sprague Pest Solutions, Tacoma, WA

3:00 **2289** Update from USDA - ARS San Joaquin Valley Agricultural Sciences Center. **Spencer Walse** (spencer.walse@ars.usda.gov), USDA - ARS, Parlier, CA

3:15 Break

3:30 **2290** Nitric oxide fumigation for postharvest control of pests and pathogens. **Yong-Biao Liu** (yongbiao.liu@ars.usda.gov)¹, Xiangbing Yang² and Soohyung Oh³, ¹USDA - ARS, Salinas, CA, ²Univ. of California, Salinas, CA, ³Univ. of California, Davis, CA

3:45 **2291** Application of ozone gas for stored product insect management: Recent developments and directions for the future. **Rizana M. Mahroof** (rmahroof@scsu.edu), South Carolina State Univ., Orangeburg, SC

4:00 **2292** Response of four stored product pests to MaxForce FC gel bait. **Sharon Dobesh** (sdobesh@ksu.edu)¹ and Frank Arthur², ¹Kansas State Univ., Manhattan, KS, ²USDA - ARS, Manhattan, KS

4:15 **2293** The promise of long-lasting insecticide-incorporated netting for diversifying post-harvest IPM programs for food facilities. **Rachel Wilkins** (rachwil15@gmail.com)¹ and William Morrison², ¹Kansas State Univ., Manhattan, KS, ²USDA - ARS, Manhattan, KS

4:30 **2294** Effects of infrared radiation on germination of long grain rice. **Tanja McKay** (tmckay@astate.edu)¹, Rachel Hampton¹, Griffiths Atungulu², Virginie Rolland³ and Shantae Wilson², ¹Arkansas State Univ., Jonesboro, AR, ²Univ. of Arkansas, Fayetteville, AR, ³Arkansas State Univ., State Univ., AR

4:45 **2295** Incorporating postharvest fumigation into a systems approach in Hawai'i. **Dong H. Cha** (dong.cha@ars.usda.gov)¹, Byung-Ho Lee¹, Jian Chen², Spencer Walse³ and Marisa Wall¹, ¹USDA - ARS, Hilo, HI, ²USDA - ARS, Stoneville, MS, ³USDA - ARS, Parlier, CA

5:00 **2350** Efficacy of three alternative fumigants to mitigate *Lasioderma serricorne* (Fabricius) (Coleoptera: Anobiidae) and *Tyrophagus putrescentiae* (Schrank) (Acarina: Acaridae)

Jacqueline Maille (jmaille@ksu.edu)¹, Gomaa Ramadan¹, Peter Edde², M. Wes Schilling³ and Thomas Phillips¹, ¹Kansas State Univ., Manhattan, KS, ²Altria Client Services, Inc, Richmond, VA, ³Mississippi State Univ., Mississippi State, MS

5:15 Discussion

Member Symposium: Social Resilience: Understanding How Environmental Stressors Impact Social Insects, from the Individual to the Collective Scales

Room 126 (America's Center)

Moderators and Organizers: James Crall¹ and S. Hollis Woodard², ¹Harvard Univ., Cambridge, MA, ²Univ. of California, Riverside, CA

1:30 Introductory remarks

1:45 **2296** Individual and social immunity in feral honey bees. **Margarita López-Uribe** (mmil64@psu.edu), Chauncy Hinshaw, Kathleen Evans, Christina M. Grozinger and Cristina Rosa, Pennsylvania State Univ., University Park, PA

2:00 **2297** Bees' nutrition: The secrets of a collective therapy. **Mathieu Lihoreau** (mathieu.lihoreau@univ-tlse3.fr)¹ and Tamara Gomez-Moracho², ¹Univ. Paul Sabatier, Toulouse, France, ²Univ. of Toulouse, Toulouse, France

2:15 **2298** Variation in social strategies along environmental gradients. **Jessica Purcell** (jessica.purcell@ucr.edu), Univ. of California, Riverside, CA

2:30 **2299** The ecology of social evolution in bees. **Sarah Kocher** (skocher@gmail.com), Princeton Univ., Princeton, NJ

2:45 **2300** Presentation withdrawn

3:00 **2301** Division of labor in bumble bee microcolonies: A tool for studying responses to resource fluctuations. **Kaleigh Fisher** (kfish002@ucr.edu), Erica Sarro and S. Hollis Woodard, Univ. of California, Riverside, CA

3:15 **2302** The social scaling of stress-sensitivity: Understanding the impacts of pesticide exposure and temperature stress in bumblebee colonies. **James Crall** (jcrall@oeb.harvard.edu)¹, August Easton-Calabria¹, Kayleigh Cronin¹, Jessie Thuma¹, Biswadip Dey², Ashlee Ford Versypt³ and Benjamin L. de Bivort¹, ¹Harvard Univ., Cambridge, MA, ²Princeton Univ., Princeton, NJ, ³Oklahoma State Univ., Stillwater, OK

3:30 Panel discussion

Member Symposium: Tick Endosymbionts: Obligatory, Facultative, or Idiosyncratic?

Room 120 (America's Center)

Moderators and Organizers: Mackenzie Tietjen and Raul F. Medina, Texas A&M Univ., College Station, TX

1:30 Introductory remarks

1:35 **2303** Hematophagous arthropods: Lessons learned from the tsetse fly. **Rita Rio** (rita.rio@mail.wvu.edu), West Virginia Univ., Morgantown, WV

Oral Presentations

Wednesday, November 20

1:50 **2304** Evolution and function of tick endosymbionts. **Rahul Raghavan** (rr6@pdx.edu), Portland State Univ., Portland, OR

2:05 **2305** The microbiome influences vector competence for tick-borne pathogens. **Glen Scoles** (scoles@vetmed.wsu.edu), USDA - ARS, Pullman, WA

2:20 **2306** Phylogeny and diversity of tick symbionts in Japan. **Ryo Nakao** (ryo.nakao@vetmed.hokudai.ac.jp), Hokkaido Univ., Sapporo, Japan

2:35 Break

2:50 **2307** Biotic and abiotic factors influencing the overwintering success of *Ixodes scapularis* ticks in Nova Scotia. **Amal Nabbout** (amalnabbout@hotmail.com), Dalhousie Univ., Halifax, NS, Canada

3:05 **2308** Tick microbiomes: Future challenges and opportunities for Nextgen research. **Pete Teel** (pteel@tamu.edu)¹ and Michael Allen², ¹Texas A&M Univ., College Station, TX, ²Univ. of North Texas Health Science Center, Fort Worth, TX

3:20 **2309** Comparative analysis of *Rhipicephalus annulatus* and *Rhipicephalus microplus* microbiomes using Minion long-read technology. **Robert Mitchell** (robert.mitchell@ars.usda.gov) and Adalberto A. Pérez de León, USDA - ARS, Kerrville, TX

3:35 **2310** Connecting the dots: Endosymbionts in ticks and their possible roles in the tick innate immune system. **Ryan Rego** (ryanorego.cz@gmail.com), Czech Academy of Sciences, České Budějovice, Czech Republic

3:50 Panel discussion

Member Symposium: Why and How to Advocate for the Science of Insect Control

Room 232 (America's Center)

Moderators and Organizers: Shilpa Swarup¹, Graham P. Head² and Nicholas Kalaitzandonakes³, ¹Bayer Crop Science, Chesterfield, MO, ²Bayer Crop Science, St. Louis, MO, ³Missouri Univ. Columbia, Columbia, MO

1:30 Welcoming remarks

1:35 **2311** Insect control: Kaleidoscope from Bronze Age to digital era: Status with respect to farm to fork to health. Allan Felsot, Washington State Univ., Richland, WA

1:50 **2312** Regulatory landscape and insect control: A case study of neonics. Justin Housenger and **Cameron Douglass** (douglass.cameron@epa.gov), US Environmental Protection Agency, Washington, DC

2:05 **2313** Insect control and food security: A global perspective on insect control to improve food security. **David Douches** (douchesd@gmail.com) and Natalie Kaiser, Michigan State Univ., East Lansing, MI

2:20 **2314** Challenges and opportunities for the next generation of insect control technologies. **Graham P. Head** (graham.head@bayer.com), Bayer Crop Science, Chesterfield, MO

2:35 **2315** Overcoming cross-cutting challenges in the control of mosquito-borne diseases. **Rhoel Dinglasan** (rdinglasan@epi.ufl.edu), Centers for Disease Control and Prevention, Gainsville, FL

2:50 **2316** The role of media on public perceptions of science and innovation. **Nicholas Kalaitzandonakes** (kalaitzandonakesn@gmail.com), Univ. of Missouri, Columbia, MO

3:05 Break

3:20 **2317** Promoting entomology to the general public. **Thomas Turpin** (turpinf@purdue.edu), Purdue Univ., West Lafayette, IN

3:35 **2318** Science, media, and story telling: Lessons from the CRISPR craze. **Rodolphe Barrangou** (rodolphe_barrangou@ncsu.edu), North Carolina State Univ., Raleigh, NC

3:50 **2319** How to communicate science in the era of misinformation. **Joe Ballenger** (jballeng@uwyo.edu), Univ. of Wyoming, Laramie, WY

4:05 **2320** The difference building a global network can make in effective science communication. **Joseph Opoku Gakpo** (joseph.opoku2000@gmail.com), Cornell Alliance for Science, Ithaca, NY

4:20 **2321** Life cycle of communicating science. **Slavica Pavlovic Djuranovic** (spavlov@wustl.edu), Washington University School of Medicine, St. Louis, MO

4:35 **2322** How can we rebuild public trust in science? **Steve Savage** (savage.sd@gmail.com), Savage & Associates Consulting, Vista, CA; Crop Protection Benefits Communications for CropLife Foundation, Vista, CA

4:50 Concluding remarks

10-min: PBT, Molecular and Biological Control

Room 274 (America's Center)

Moderators: Xianchun Li¹ and Bruce Webb², ¹Univ. of Arizona, Tucson, AZ, ²Univ. of Kentucky, Lexington, KY

1:30 **2323** Molecular tools for the genetic control of the spotted-wing drosophila, *Drosophila suzukii*. **Ying Yan** (ying.yan@agrar.uni-giessen.de)¹, Syeda Jafri¹, Alfred Handler² and Marc Schetelig^{1,3}, ¹Justus-Liebig-Univ., Gießen, Germany, ²USDA - ARS, Gainesville, FL, ³Fraunhofer Institute for Molecular Biology and Applied Ecology, Gießen, Germany

1:40 **2324** Discovery of novel mosquitocides from natural fungal metabolites. **Liang Li** (lij@fiu.edu), Guodong Niu and Jun Li, Florida International Univ., Miami, FL

1:50 **2325** Some laboratory studies for the evaluation of insecticidal potential of the venom of an endoparasitic wasp, *Aenasius arizonensis* (Girault) (=*Aenasius bambawalei* Hayat) (Hymenoptera, Encyrtidae). **Zain Ul Abdin** (zainunibas@gmail.com)¹, Muhammad Arshad², Muhammad Tahir³, Fiaz Hussain², Hoor Shaina², Saqi Abbas² and Ukasha Sarfraz², ¹Univ. of Agriculture, Miami, FL, ²Univ. of Agriculture, Faisalabad, Pakistan, ³Government College Univ., Lahore, Pakistan

2:00 **2326** The chitin synthase gene A is a promising target for development of insecticidal RNAi. **Wenqing Zhang** (lsszwq@mail.sysu.edu.cn), Sun Yat-Sen Univ., Guangzhou, China

2:10 **2327** Mutations increasing sterility and virulence in the *Helicoverpa zea* nudivirus 2 enable virus-mediated population suppression. **Bruce Webb** (bawebb@uky.edu), Univ. of Kentucky, Lexington, KY

Oral Presentations

2:20 **2328** Assessment of *Trichoderma* species and *Bacillus thuringiensis* integration to control insect pests of brinjal (*Solanum Melongena* L.). **Ahmad Nawaz** (nawazrajpoot@yahoo.com)¹, Muhammad Dildar Gogi¹, Muhammad Sufyan¹, Muhammad Binyameen², Muhammad Jalal Arif¹, Muhammad Bilal Ayyub¹, Shams ul Islam¹, Muhammad Waseem¹ and Ume Farwa Akhtar¹, ¹Univ. of Agriculture, Faisalabad, Pakistan, ²Bahauddin Zakariya Univ., Multan, Pakistan

2:30 Break

2:40 **2329** Use of microcontroller systems in insect trap and mating disruption applications. **Richard Mankin** (richard.mankin@ars.usda.gov)¹ and Barukh Rohde², ¹USDA - ARS, Gainesville, FL, ²Univ. of Florida, Gainesville, FL

2:50 **2330** Comparative efficacy of CO₂ and ozone gases against *Cadra cautella* (Lepidoptera: Pyralidae) larvae under different temperature regimes. **Khwaja Rasool** (gkhawaja@ksu.edu.sa)¹, Mureed Husain¹, Muhammad Tufail^{1,2} and Abdulrahman Aldawood¹, ¹King Saud Univ., Riyadh, Saudi Arabia, ²Ghazi Univ., Dera Ghazi Khan, Pakistan

3:00 **2331** Comparative efficacy of some plant derived oils against two stored commodities insect pests. **Habib ur Rehman** (habib.ento@gmail.com)¹, Mansoor ul Hasan¹, Muhammad Sagheer¹, Qurban Ali², Shah Zaman¹ and Saima Mirza¹, ¹Univ. of Agriculture, Faisalabad, Pakistan, ²Ayub Agricultural Research Institute, Faisalabad, Pakistan

3:10 **2332** Evaluation of a novel MOA biological peptide insecticide for greenhouse and field use. **Tim Ksander** (tksander@vestaron.com) and Daniel Peck, Vestaron Corporation, Kalamazoo, MI

3:20 **2333** Engineering cell surface-displayed acetylcholinesterase for enzymatic analyses and pesticide detection. Chih-Hsuan Tsai, Lin-Li Liao, Chuan-Yu Liao and **Yu-Chan Chao** (mbycchao@imb.sinica.edu.tw), Academia Sinica, Taipei, Taiwan

3:30 **2334** Mortality of *Tribolium castaneum* (Herbst) against plant extracts in relation to three types of flours. **Shah Zaman** (shahzaman18@gmail.com)¹, Mansoor ul Hasan¹, Muhammad Sagheer¹, Qurban Ali², Muhammad Bilal Ayyub¹, Faizan Amjad¹ and Tauqir Anwar¹, ¹Univ. of Agriculture, Faisalabad, Pakistan, ²Ayub Agricultural Research Institute, Faisalabad, Pakistan

3:40 Break

3:50 **2335** Effect of selected plant extracts on mortality of termites and their gut flagellates. **Muhammad Qureshi** (qureshienv@yahoo.com)¹, Naveeda Qureshi² and Saleh Alhewairini¹, ¹Qassim Univ., Buraidah, Saudi Arabia, ²Quaid-i-Azam Univ., Islamabad, Pakistan

4:00 **2336** Variation in effectiveness of insecticides and plant extracts applied on different packaging materials for their toxicity against *Trogoderma granarium*. **Muhammad Bilal Saleem** (bilalsaleem10@outlook.com), Muhammad Sagheer, Mansoor ul Hasan, Muhammad Awais, Mirza Muhammad Usman Hayat and Muhammad Yasir, Univ. of Agriculture, Faisalabad, Pakistan

4:10 **2337** Larvical efficacy of *Capsicum chinensis* (hot pepper) powder against mosquito larvae in the Lafia local government area, Nasarawa State, Nigeria. **Akwashiki Ombugadu** (akwash24@gmail.com)¹, Methuselah Micah¹, Victor Adejoh¹, Simon Odey¹, Victoria Pam¹, Hasley Njila², Gideon Deme¹, Pam Dung², Luka Isah², Jael Yohanna², Alhasan Aliyu¹, Hussein Ahmed¹, Peter Aimankhu¹, Scholastica Ayuba¹ and Ndubisi Uzoigwe¹, ¹Federal Univ., Lafia, Nigeria, ²Univ. of Jos, Jos, Nigeria

4:20 **2338** Insecticidal bioactivity of Spintoram® (*Saccharopolyspora spinosa*) and Mealki® (*Verticillium lecanii*) along with clove extract against saw toothed beetle (*Oryzaephilus surinamensis*). **Muhammad Sagheer** (sagheersharif@yahoo.com)¹, Mansoor ul Hasan¹, Muhammad Qasim¹, Qurban Ali², Muhammad Faisal³ and Muhammad Umar Farooq¹, ¹Univ. of Agriculture, Faisalabad, Pakistan, ²Ayub Agricultural Research Institute, Faisalabad, Pakistan, ³Pest Warning and Quality Control of Pesticides, Lahore, Pakistan

4:30 **2339** Influence of temperature and relative humidity on the efficacy of entomopathogenic fungi against granary weevil, *Sitophilus granarius* (L.). **Mansoor ul Hasan** (mansoorsahi2000@yahoo.com)¹, Shah Zaman¹, Qurban Ali², Habib ur Rehman¹, Muhammad Bilal Ayyub¹ and Tauqir Anwar¹, ¹Univ. of Agriculture, Faisalabad, Pakistan, ²Ayub Agricultural Research Institute, Faisalabad, Pakistan

4:40 **2340** Selectivity of abamectin to the predator *Chrysoperla externa* (Hagen) (Neuroptera: Chrisopidae). Wesley Paula¹, Gabriel Botelho¹, Bruno Dami¹, Andriely Silva¹, Pâmela Faria¹, Eder Cabral¹, Gustavo Figueiredo² and **Alessandra Vacari** (alessandra.vacari@unifran.edu.br)¹, ¹Univ. of Franca, Franca, Brazil, ²FAFRAM Dr. Francisco Maeda College, Ituverava, Brazil

10-min: P-IE, Transgenic Crops

Room 230 (America's Center)

Moderators: Michael Brewer¹ and Amit Sethi², ¹Texas A&M AgriLife Research, Corpus Christi, TX, ²Corteva Agriscience, Johnston, IA

1:30 **2341** Association of insect-derived ear injury to aflatoxin and yield of maize that varied in incorporation of Bt transgenes and was grown in the southern U.S. Great Plains. Luke Pruter¹, **Michael Brewer** (mjbrewer@ag.tamu.edu)¹, Mark Weaver², Seth Murray³ and Thomas Isakeit³, ¹Texas A&M AgriLife Research, Corpus Christi, TX, ²USDA - ARS, Stoneville, MS, ³Texas A&M Univ., College Station, TX

1:40 **2342** F2 screen and selection of resistance to Cry1A.105 and Cry2Ab2 in *Helicoverpa zea*. **Fangneng Huang** (fhuang@agcenter.lsu.edu)¹, Wenbo Yu¹, Graham P. Head², Paula A. Price³, Jianguo Guo¹, Ying Niu¹, Marcelo Dimase¹, Francis Reay-Jones⁴, Don Cook⁵, Sebe Brown⁶, Xinzhi Ni⁷, Dominic Reisig⁸ and Silvana Paula-Moraes⁹, ¹Louisiana State Univ., Baton Rouge, LA, ²Bayer Crop Science, Chesterfield, MO, ³Bayer Crop Science, St. Louis, MO, ⁴Clemson Univ., Florence, SC, ⁵Mississippi State Univ., Stoneville, MS, ⁶Louisiana State Univ., Winnsboro, LA, ⁷USDA - ARS, Tifton, GA, ⁸North Carolina State Univ., Plymouth, NC, ⁹Univ. of Florida, Jay, FL

1:50 **2343** Performance of PowerCore Ultra (Cry1F+Cry2Ab2+Cry1A.105+Vip3A20) on primary maize pests in Argentina and Brazil. Cesar Santos¹, Florencia Figueroa Bunge², Valeria Moscardini³, Luiz Marques⁴, **James Bing** (james.bing@corteva.com)⁵ and Timothy M. Nowatzki⁶, ¹Corteva Agriscience, São Paulo, Brazil, ²Corteva Agriscience, Buenos Aires, Argentina, ³Corteva Agriscience, Minas Gerais, Brazil, ⁴Corteva Agriscience, Mogi Mirim, Brazil, ⁵Corteva Agriscience, Johnston, IA

2:00 **2344** An engineered Cry1B protein active on *Spodoptera frugiperda*. **Virginia Crane** (virginia.crane@corteva.com), Corteva Agriscience, Johnston, IA

Oral Presentations

2:10 **2345** Evaluation of the potential prey-mediated effects of MON 88702 cotton on nymphs of the insidious flower bug, *Orius insidiosus* (Say) (Heteroptera: Anthocoridae), in tri-trophic feeding tests. **Collin Preftakas** (collin.preftakas@bayer.com), Garima Kakkar¹, Jennifer Fridley¹, Becky Roper¹, Jianguo Tan¹, Harit K. Bal², Jessica Komorek¹, Andrew Deffenbaugh¹, Peter Asimwe¹, Luis Burzio¹ and Christopher Brown¹, ¹Bayer Crop Science, Chesterfield, MO, ²The Ohio State Univ., Wooster, OH

2:20 **2346** Tier 1 evaluation of potential effects of Cry51Aa2.834_16 protein on nymphs of *Geocoris punctipes* and *Nabis alternatus*. **Jianguo Tan** (jianguo.tan@bayer.com), Peter Asiimwe, Becky Roper, Garima Kakkar, Jennifer Fridley, Geoffrey Mueller, Collin Preftakes, Xin Li, Lieselot Bertho, Luis Burzio and Christopher Brown, Bayer Crop Science, Chesterfield, MO

2:30 **2347** First report of European corn borer resistance against Cry1F in Nova Scotia, Canada. **Amit Sethi** (amit.sethi@pioneer.com), Ashley Miles, Matt Wihlm, Jeanette Dyer, Kelly Jordan, Benchie Ortegon, Jianzhou Zhao and Andre Crespo, Corteva Agriscience, Johnston, IA

NOTES:

Glossary of Terms and Abbreviations

10-min: Ten-minute (oral) papers

3-min: Three-minute presentations

APHIS: Animal Plant and Health Inspection Service

ARS: Agricultural Research Service

Bt: *Bacillus thuringiensis*

CABI: Centre for Agriculture and Bioscience International

CÉROM: Grain Research Center

CIRAD: Centre for International Cooperation in Agronomic Research for Development

CNRS: National Center for Scientific Research

CONICET: National Scientific and Technical Research Council

CSIRO: Commonwealth Scientific and Industrial Research Organization

DXXXX: This denotes a poster display and can be found on boards in the main poster area.

ESA: Entomological Society of America

ICAR: Indian Council of Agricultural Research

INDCASAT: Institute of Scientific Research and High Technology Services

INERA: Environmental Institute for Agricultural Research

INRA: National Institute of Agronomic Research

INTA: National Agricultural Technology Institute

IPM: Integrated Pest Management

Member Symposia: A wide range of topics and subject matter are covered by this category; some of which are very narrowly focused.

MUVE: Medical, Urban, and Veterinary Entomology. One of the Section topics.

NIFA: National Institute of Food and Agriculture

Organized Meeting: Specialty groups that hold their business meeting, student competitions, and other activities in conjunction with the ESA Annual Meeting are represented in this category.

PBT: Physiology, Biochemistry, and Toxicology. One of the Section topics.

P-IE: Plant-Insect Ecosystems. One of the Section topics.

Program Symposia: The meeting's top-tier symposia. These are broad in scope, reflect the theme of the meeting, "Advocate Entomology!," and include international collaborations.

SDXXXX: This denotes a poster display featured in a symposium. Symposium displays will be on poster boards outside of the session room for the duration of the symposium.

SENASA: National Service of Agricultural Health and Quality

SPXXXX: This denotes a submitted 10-minute presentation featured in a symposium.

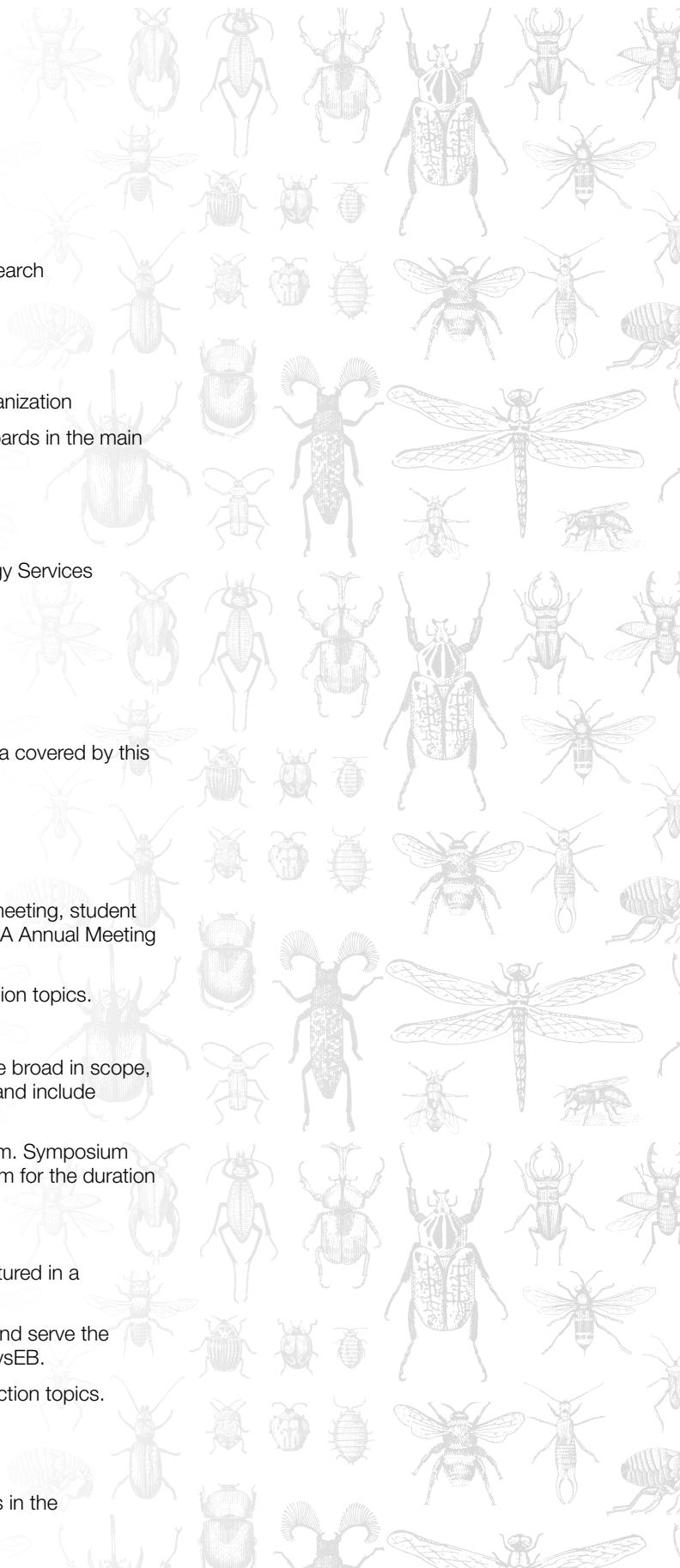
Section Symposia: These symposia are overarching in theme and serve the interest of one or more Section topics: MUVE, PBT, P-IE, SysEB.

SysEB: Systematics, Evolution, and Biodiversity. One of the Section topics.

USDA: United States Department of Agriculture

USDI: United States Department of the Interior

VP: This denotes a virtual poster and can be found on monitors in the poster area.



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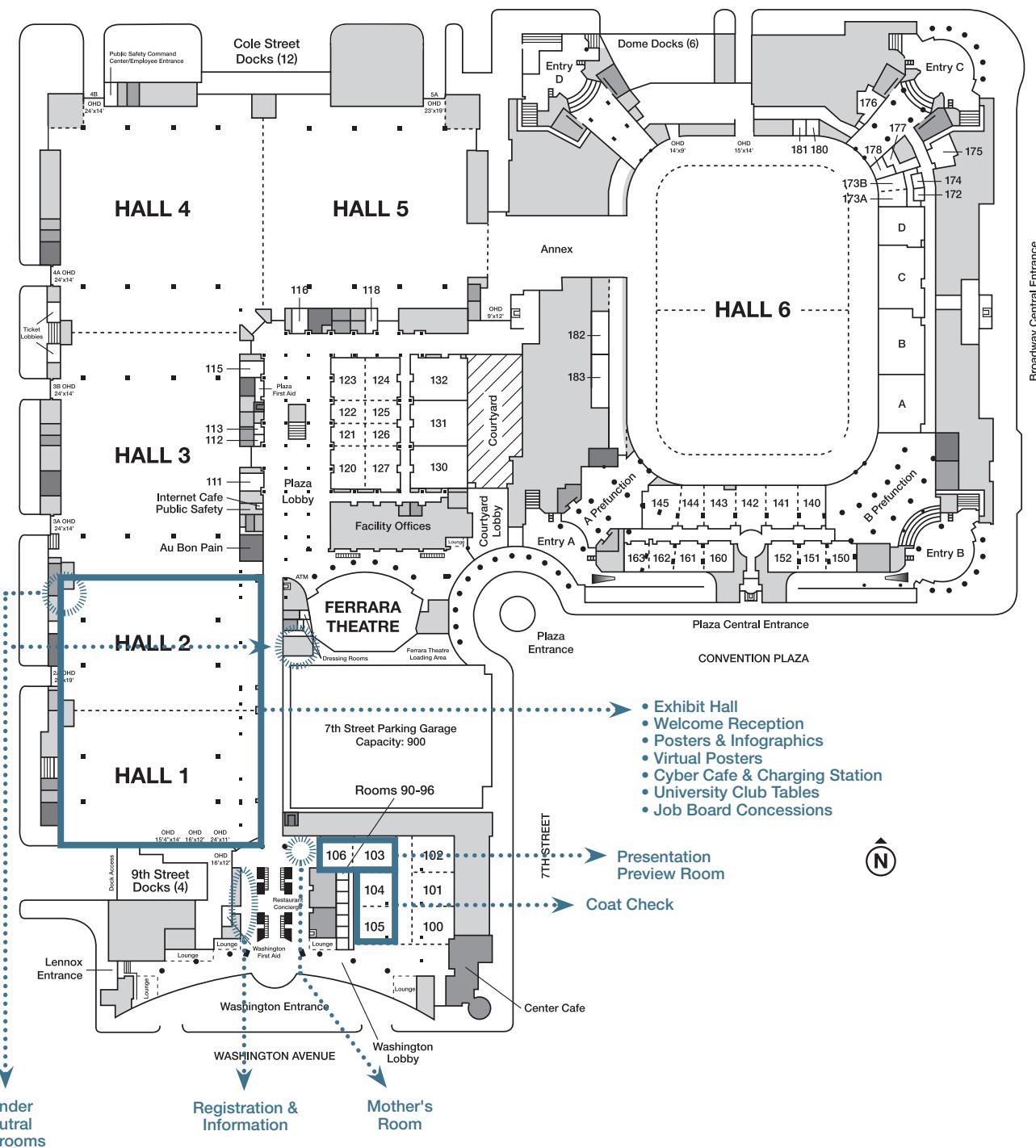
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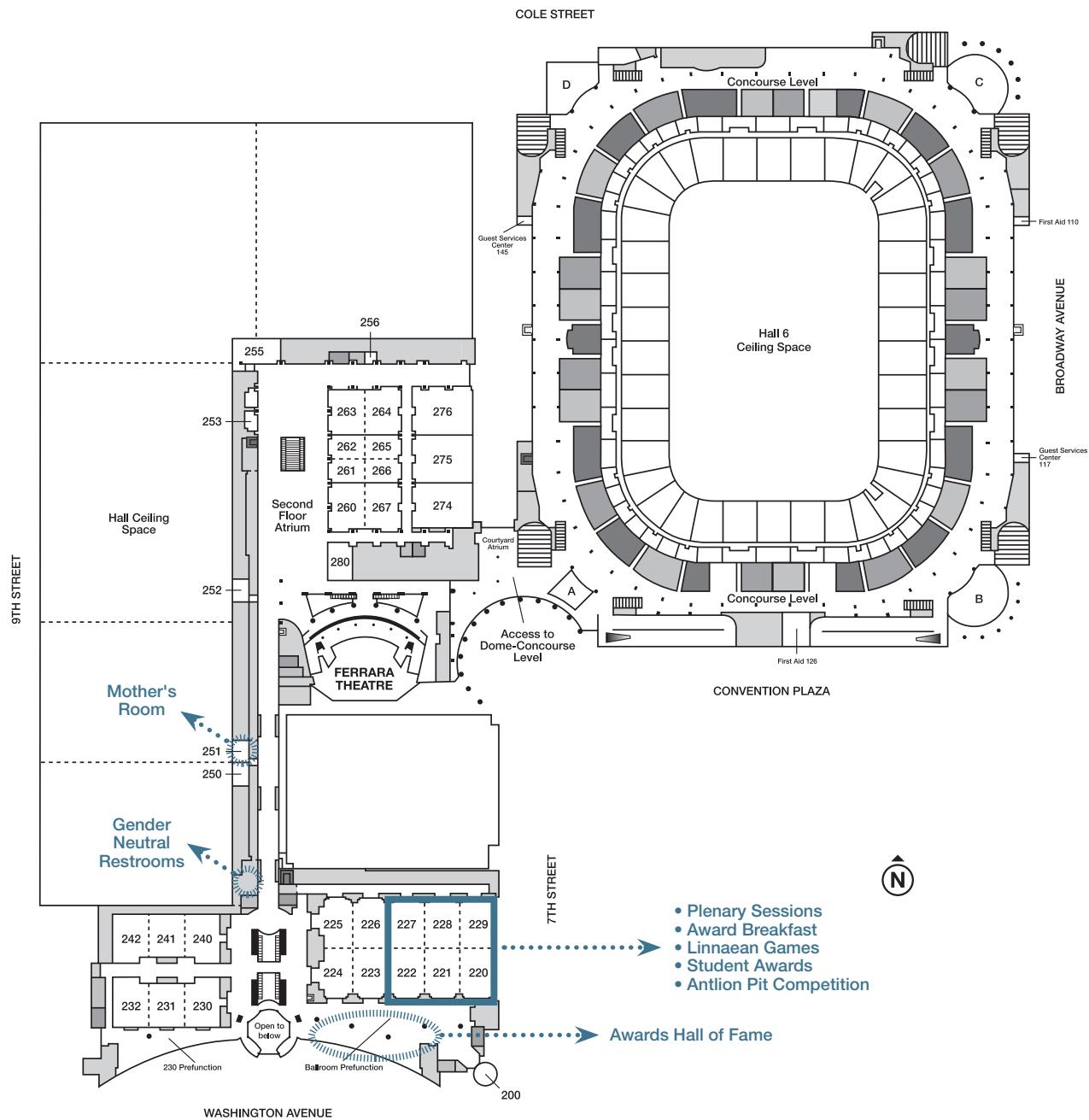
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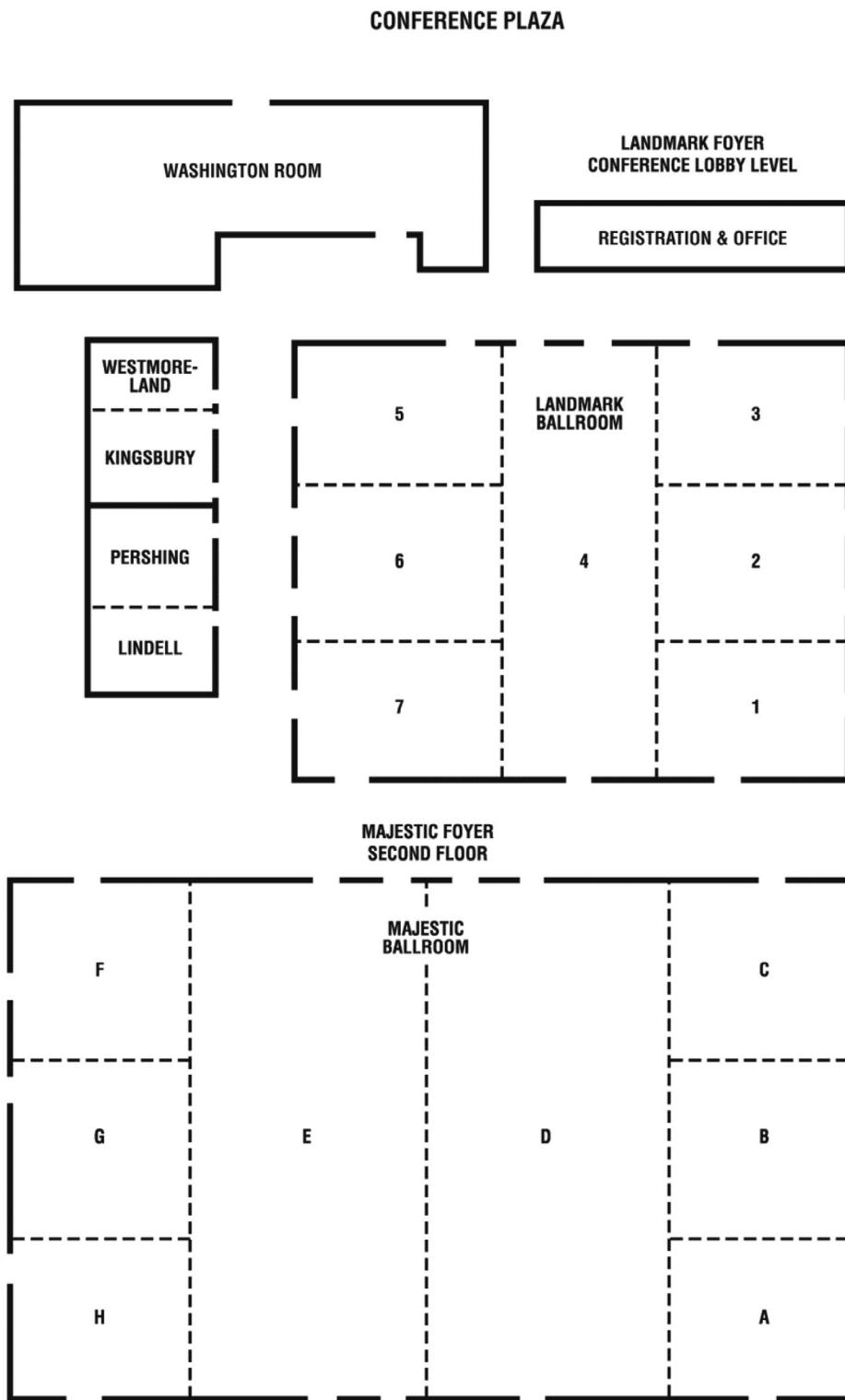
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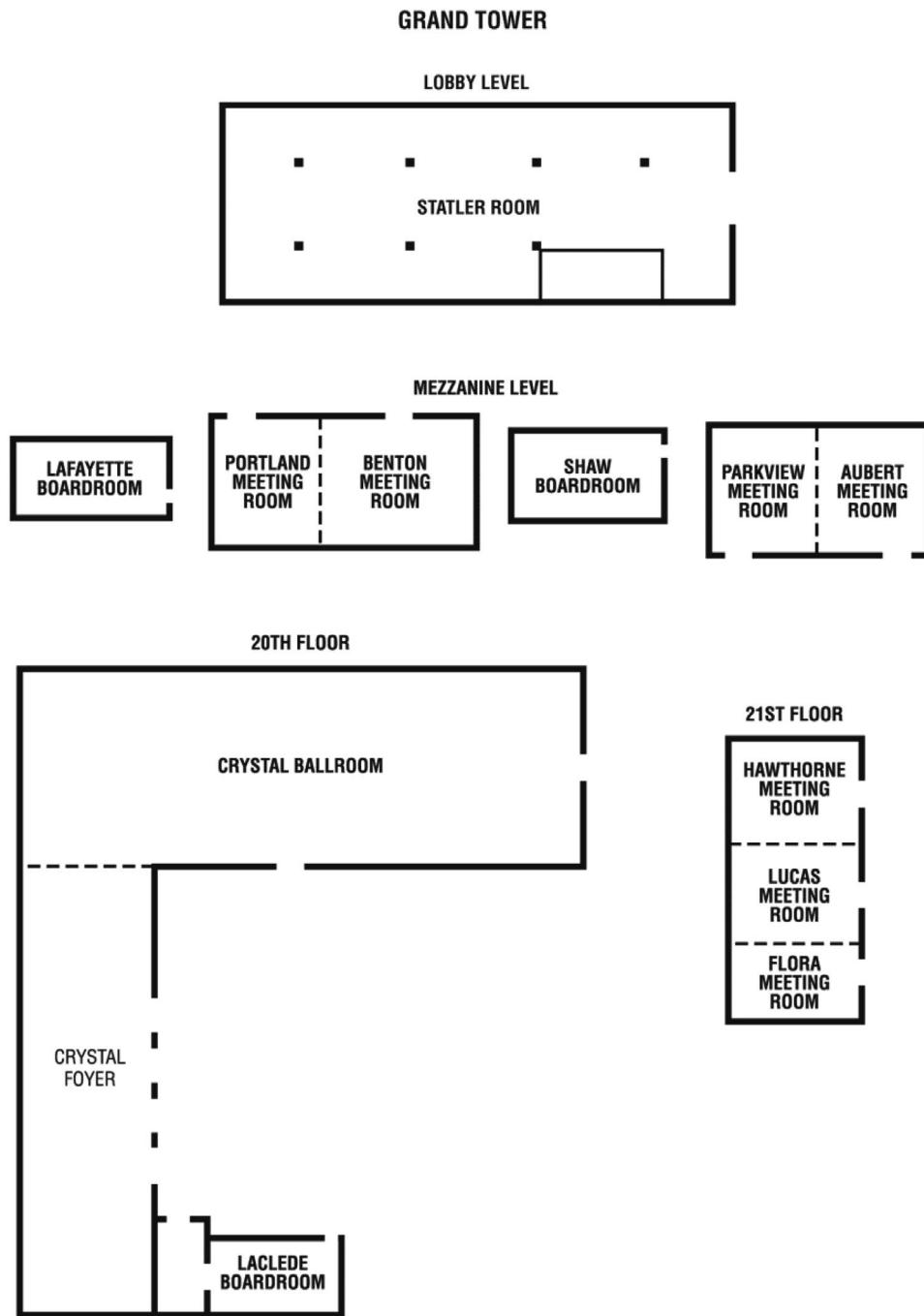
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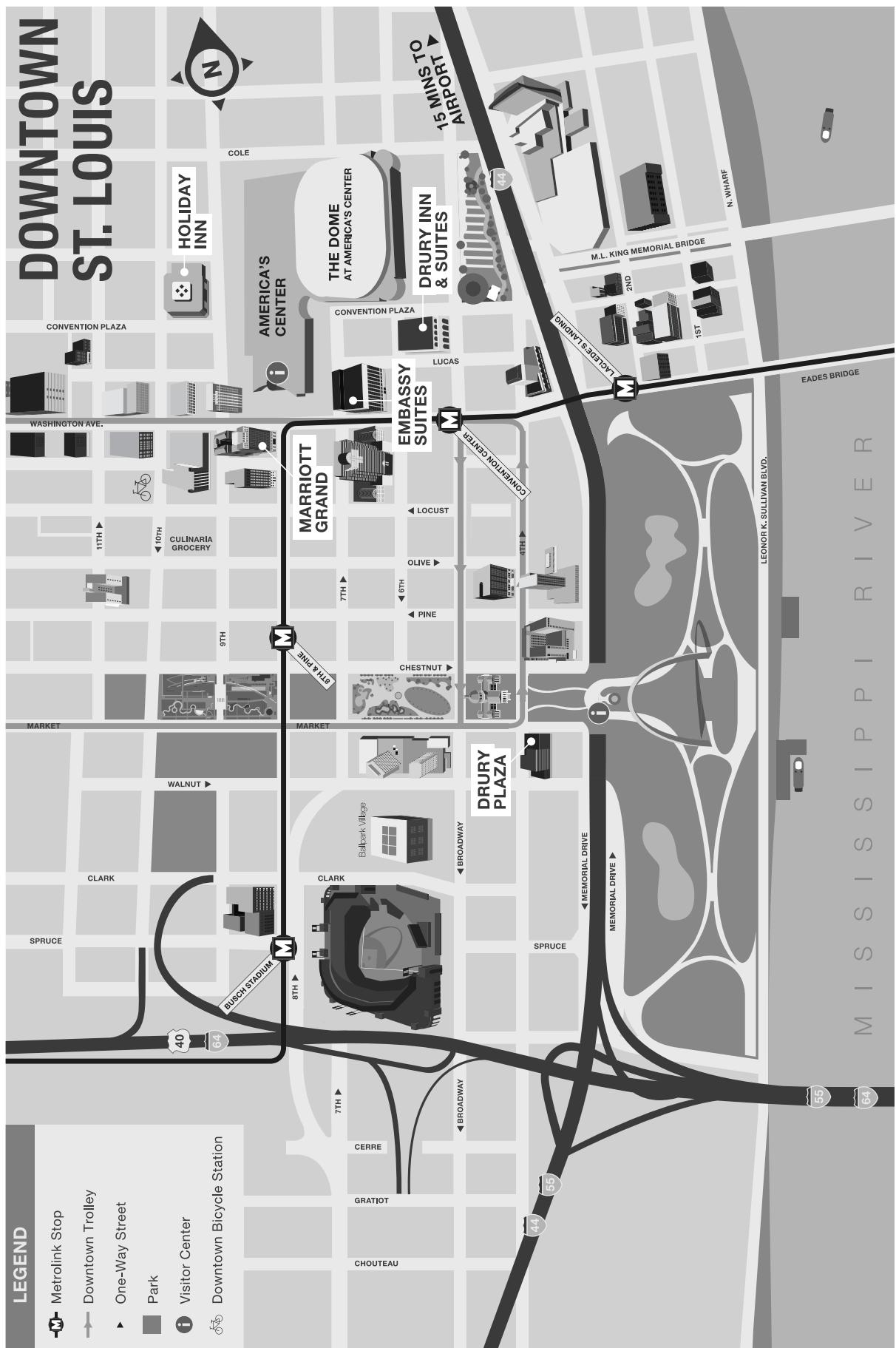


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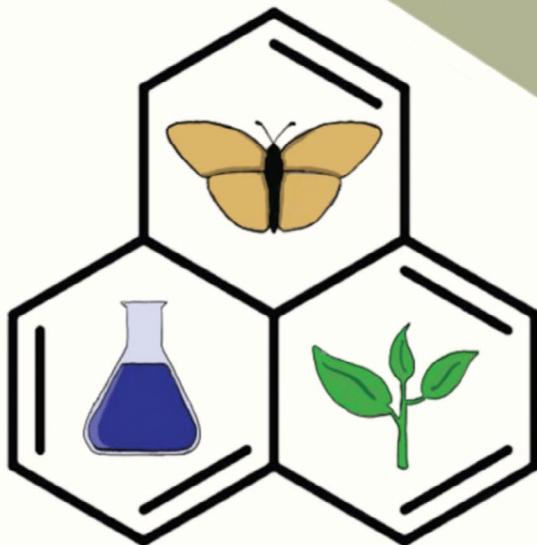
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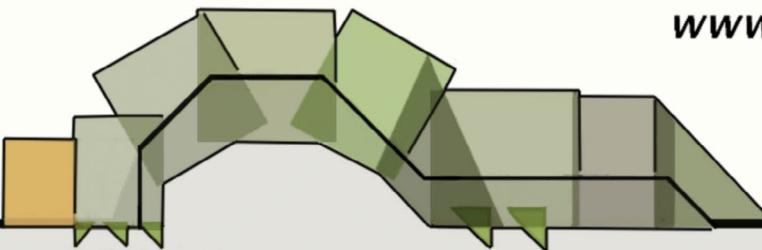
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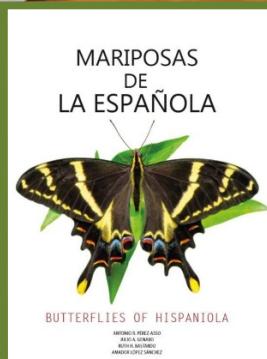
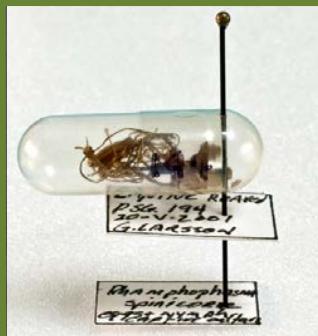
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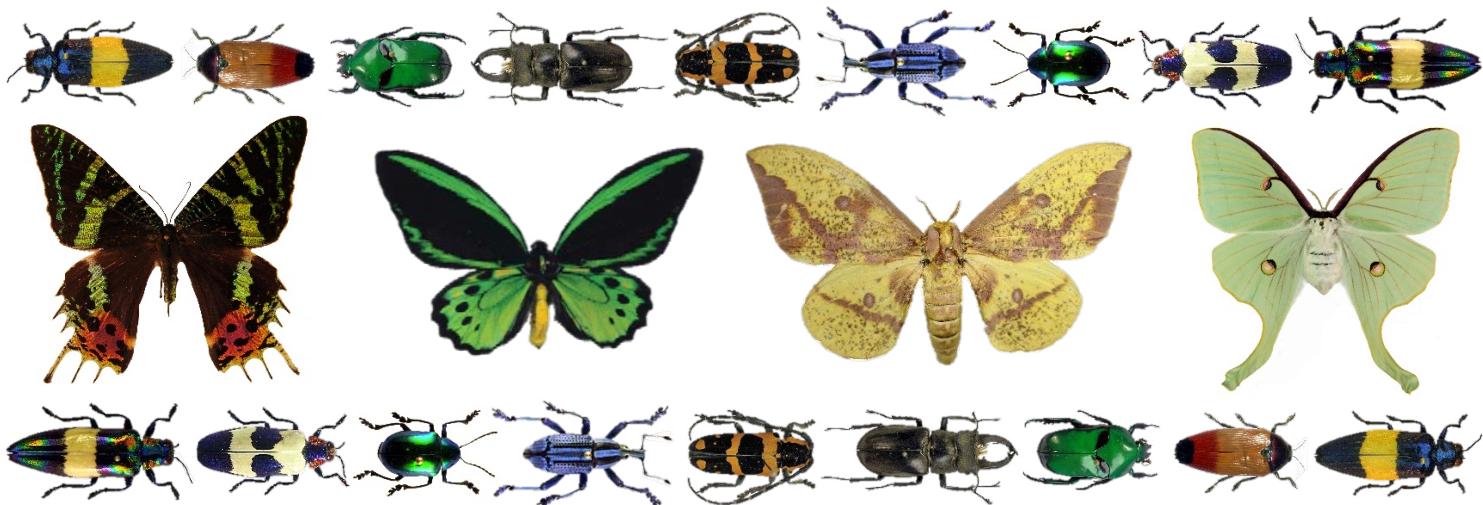


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